

HISTOIRE GÉNÉRALE ET ICONOGRAPHIE DES LÉPIDOPTÈRES ET DES CHENILLES DE
L'AMÉRIQUE SEPTENTRIONALE BY BOISDUVAL & LE CONTE (1829-[1837]): ORIGINAL DRAWINGS
USED FOR THE ENGRAVED PLATES AND THE TRUE IDENTITIES OF FOUR FIGURED TAXA

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ABSTRACT. A set of 149 Lepidoptera drawings is currently deposited in the Thomas Cooper Library, University of South Carolina. Forty of the 55 butterfly drawings include figures that were copied for the engraved plates in *Histoire Générale et Iconographie des Lépidoptères et des Chenilles de l'Amérique Septentrionale* (Boisduval & Le Conte 1829-[1837]). Identifications are provided herein for the 80 butterfly species in these drawings, as well as manuscript notes that likely accompanied 21 other drawings reproduced in *Histoire Générale*. *Pieris cleomes* Boisduval & Le Conte is shown to be synonymous with *Ascia monuste phileta* (Fabricius). The figures identified as *Thecla favonius* (J. E. Smith) represent both *Satyrium favonius* and *Strymon melinus* (Hübner). The figures identified as *Libythea motya* (Hübner) represent *Libytheana motya* and *Libytheana carinenta bachmanii* (Kirtland). Also included are remarks about the identity of *Melitaea ismeria* Boisduval & Le Conte and the validity of the Boisduval type specimens of North American Lepidoptera.

Additional key words: John Abbot, Émile Blanchard, Paul Duménil, Georgia, South Carolina, type locality.

I recently traced the history of a set of 149 Lepidoptera drawings now deposited in the Thomas Cooper Library, University of South Carolina (Calhoun 2003). These were rendered in graphite and watercolor by at least four artists: English naturalist John Abbot (1751-ca.1840), who resided in Virginia and Georgia from 1773 until his death; French zoologist Émile (or Charles Émile) Blanchard (1819-1900); French engraver and publisher Paul C. R. C. Duménil (1779-?); and probably American naturalist John E. Le Conte, Jr. (1784-1860). My analysis of these drawings confirmed the claim of art historian Vivian Rogers-Price (1983) that some were copied for plates in *Histoire Générale et Iconographie des Lépidoptères et des Chenilles de l'Amérique Septentrionale* [General History and Iconography of the Lepidoptera and the Caterpillars of Northern America] by Jean B. A. D. de Boisduval and J. E. Le Conte, Jr., published in 26 livraisons from 1829 to 1837 (usually cited as [1833]). After the publication of *Histoire Générale*, Boisduval retained these drawings for many years and they eventually passed into the hands of lepidopterist Charles M. Oberthür. Oberthür died in 1924 and the drawings have not been examined by another lepidopterist since that time.

These 149 drawings are of great relevance to American lepidopterists. The Thomas Cooper Library has digitized all 149 drawings and made them available for viewing on the Internet (USC 2003). As part of their study, I was afforded the opportunity to offer identifications and other pertinent information. Due

to the ephemeral nature of Internet web sites, I have decided to also present this data in print and incorporate many additional details. I also provide information on three sets of surviving manuscript notes by John Abbot that contain entries relevant to published plates in Boisduval & Le Conte (1829-[1837]). Evidence from this research clarifies the origin of specimens figured in Boisduval & Le Conte (1829-[1837]) and resolves the status of *Pieris cleomes* Boisduval & Le Conte, as well as the butterflies figured as *Thecla favonius* (J. E. Smith) and *Libythea motya* (Hübner). Further evidence regarding the identity of *Melitaea ismeria* Boisduval & Le Conte augments Calhoun (2003).

MATERIALS AND METHODS

The butterfly drawings at the University of South Carolina were examined (in person and through digital scans) and compared with the published plates in Boisduval & Le Conte (1829-[1837]). Also consulted were the plates in Smith & Abbot (1797), as well as original drawings and manuscript notes by John Abbot deposited in the Alexander Turnbull Library (Wellington, New Zealand), the Houghton Library (Harvard University), and The Natural History Museum, London. Inscriptions on the drawings were compared with the known handwriting of Abbot, Boisduval, and Le Conte. The National Museum of Natural History (Washington, D. C.) and The Natural History Museum, London, were searched for relevant specimens from Boisduval's collection.

RESULTS

Original butterfly drawings. Fifty-five of the

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TABLE 1. Butterfly species depicted in original drawings at the Thomas Cooper Library, University of South Carolina. B&L = Boisduval & Le Conte (1829-[1837]). Figures: D = dorsal, V = ventral, m = male, f = female, L = larva, P = pupa.

No.	Artist	Species depicted	Figures	B&L plate	Figures copied for B&L	Artist credited on B&L plate	B&L name
1	Abbot	<i>Papilio crespontes</i> Cramer	Df,Vf,L,P	12,13	Df,Vf,L,P	Abbot	<i>Papilio Thoas</i>
NOTES: drawing has a penciled reference to B&L Plates 12 and 13.							
2	Abbot	<i>Eurytides marcellus</i> (Cramer)	Dm,Vm,L,P	2	Dm,Vm,L,P	Abbot	<i>Papilio Marcellus</i>
NOTES: depicts the summer form "lecontei" (Rothschild & Jordan), named in honor of B&L coauthor J. E. Le Conte. Includes Abbot's inscription, "Autumnal Ajax."							
3	Abbot	<i>Eurytides marcellus</i> (Cramer)	Dm,Df,Vm,L,P	1	Dm,Vm,L,P	Abbot	<i>Papilio Ajax</i>
NOTES: depicts the spring form "marcellus" and has a penciled reference to B&L Plate 1. Includes Abbot's inscription, "Spring Ajax." Drawing was figured by Rogers-Price (1983).							
4	Duménil?	<i>Eurytides celadon</i> (Lucas)	Df, Vf	3	Df, Vf	Abbot	<i>Papilio Simon</i>
NOTES: the style seems consistent with drawing 37 that Boisduval attributed to Duménil.							
5	Abbot	<i>Papilio polyxenes</i> (Fabricius)	Df	—	—	—	—
NOTES: includes Abbot's inscription "Ni Female."							
6	Abbot	<i>Papilio polyxenes</i> (Fabricius)	Dm,Vm,L,P	4	Dm,Vm,L,P	Abbot	<i>Papilio Asterias</i>
NOTES: includes a penciled reference to B&L Plate 4. Includes Abbot's inscription "Ni Male Troilus."							
7	Abbot	<i>Ascia monuste</i> (Linnaeus)	Dm,Df,Vm,L,P	16	Dm,Df,Vf,L,P	Abbot	<i>Pieris Cleomes</i>
NOTES: includes a penciled reference to B&L Plate 16, which was copied from this drawing and another from Abbot with a hostplant (see text). Figures in this drawing were probably used for the original description of <i>P. cleomes</i> . See Figs 10, 11.							
8	Abbot	<i>Phoebis sennae</i> (Linnaeus)	Df,Dm,Vf,L,P	24	Df,Dm,Vf,L,P	Abbot	<i>Callidryas Eubule</i>
NOTES: includes a penciled reference to B&L Plate 24 and Abbot's inscription, "Eubule." The ventral female on B&L Plate 24 was misidentified as a male. Scudder (1888-1889, Pl. 76, fig. 2) copied the larva. Holland (1898, Pl. 2, fig. 2) and Klots (1951, Pl. 5, fig. 25) reproduced Scudder's larva.							
9	Abbot	<i>Zerene cesonia</i> (Stoll)	Dm,Df,Vf,L,P	22	Dm,Df,Vf,L,P	Abbot	<i>Colias Coesonia</i>
NOTES: includes a penciled reference to Plate 22, which was probably copied from this drawing and another from Abbot with duplicate figures and a hostplant. Although the ventral figure is identified on the B&L plate as a male, the corresponding figure in this drawing appears to be a female.							
10	Abbot	a. <i>Parrhasius m-album</i> (B&L) b. <i>Strymon melinus</i> (Hübner)	Dm,Df,Vm,L,P Dm,Vm,L,P	27 —	Dm,Df,Vm,L,P —	Abbot —	<i>Thecla Psyche</i> —
NOTES: the figures of <i>P. m-album</i> were probably consulted for the original description of <i>T. psyche</i> . Includes a penciled reference to B&L Plate 27 and figure numbers used on the plate. The hostplant "smilax" is written below the figures of <i>S. melinus</i> . Although Oberthür (1920) believed these figures of <i>S. melinus</i> were copied for B&L plate 28 of <i>T. hyperici</i> , they are not analogous.							
11	Abbot	a. <i>Callophrys niphon</i> (Hübner) b. <i>Satyrrium titus</i> (Fabricius) c. <i>Callophrys gryneus</i> (Hübner)	Df,Vf,L,P Dm,Df,Vf,L,P Dm,Vf,L,P	33 34 33	Df,Vf,L,P Dm,Df,Vf,L,P Dm,Vf,L,P	Abbot Abbot Abbot	<i>Thecla Niphon</i> <i>Thecla Mopsus</i> <i>Thecla Smilacis</i>
NOTES: the figures of <i>C. gryneus</i> were probably consulted for the original description of <i>T. smilacis</i> . Adult figures of <i>S. titus</i> from this drawing and the ventral male of Duménil's drawing 13 were used to illustrate the species on B&L Plate 34. Le Conte wrote "Pine" below <i>C. niphon</i> , "Oak, <i>Eupatorium coelestinum</i> " below <i>S. titus</i> , and "Smilax" below <i>C. gryneus</i> . These plants were reported as hosts for these butterflies in B&L. Scudder (1888-1889) copied the pupa of <i>C. niphon</i> (Pl. 84, fig. 40), the larva and pupa of <i>S. titus</i> (Pl. 75, fig. 35; Pl. 84, fig. 37), and the larva and pupa of <i>C. gryneus</i> (Pl. 75, fig. 31; Pl. 84, fig. 30). Holland (1898, Pl. 5, figs. 30, 37 & 40) and Klots (1951, Pl. 5, fig. 14) reproduced some of Scudder's figures. See Fig. 4.							
12	Abbot	a. <i>Satyrrium liparops</i> (Le Conte) b. <i>Callophrys henrici</i> (Grote & Robinson)	Df,Vf,L,P Dm,Df,Vf,L,P	31 31	Df,Vf,L,P Df,Vf,L,P	Abbot Abbot	<i>Thecla Liparops</i> <i>Thecla Irus</i>
NOTES: the figures of <i>S. liparops</i> were used for the original description of <i>Thecla liparops</i> . Le Conte wrote "Oak, Chestnut" below the figures of <i>S. liparops</i> (mentioned by Scudder (1888-1889) and in his notes at Harvard). "Vaccinium" is written below the figures of <i>C. henrici</i> , which corresponds to the mention of "vaccinium" as a hostplant of this species in B&L. <i>C. henrici</i> was not described until 1867 and was often confused with <i>C. irus</i> in earlier literature. Scudder (1888-1889, Pl. 75, fig. 28) copied the larva of <i>C. henrici</i> (as " <i>Incisalia irus</i> "). See Figs. 3, 6.							
13	Duménil?	a. <i>Satyrrium titus</i> (Fabricius) b. <i>Strymon melinus</i> (Hübner) c. <i>Pacetes pygmaea</i> (Hübner)	Dm,Vm Dm,Vm Dm	34 — —	Vm — —	Abbot — —	<i>Thecla Mopsus</i> — —
NOTES: the ventral male of <i>S. titus</i> from this drawing and the adults of Abbot's drawing 11 were used to illustrate the species on B&L Plate 34.							

TABLE 1. Continued

No.	Artist	Species depicted	Figures	B&L plate	Figures copied for B&L	Artist credited on B&L plate	B&L name
14	Blanchard a.	<i>Calyceopsis cecrops</i> (Fabricius)	Dm,Df,Vm,Vf	35	Dm,Df,Vm,Vf	Abbot	<i>Thecla Poedas</i>
	b.	<i>Hemiargus ceraunus</i> (Fabricius)	Dm,Df,Vf	35	Dm,Df,Vf	Abbot	<i>Argus Pseudoptiletes</i>
NOTES: entire drawing was copied for B&L Plate 35 in the same layout. Figures of <i>H. ceraunus</i> accompanied the original description of <i>A. pseudoptiletes</i> and are consistent with the Floridian <i>H. c. antibubastus</i> (Hübner).							
15	Blanchard a.	<i>Lycaena hylus</i> (Cramer)	Dm,Df,Vm	38	Dm,Df,Vm	Abbot	<i>Polyommatus Thoe</i>
	b.	<i>Lycaena epixanthe</i> (B&L)	Df,Vm	38	Df,Vm	Abbot	<i>Polyommatus Epixanthe</i>
NOTES: entire drawing was copied for B&L Plate 38 in the same layout. Figures of <i>L. epixanthe</i> accompanied the original description of <i>P. epixanthe</i> .							
16	Abbot a.	<i>Celastrina ladon</i> (Cramer)	Dm,Df,Vm,L,P	36	Dm,Df,Vm,L,P	Abbot	<i>Argus Pseudargiolus</i>
	b.	<i>Cupido comyntas</i> (Codart)	Dm,Df,Vm,L,P	36	Dm,Df,Vm,L,P	Abbot	<i>Argus Comyntas</i>
NOTES: the figures of <i>C. ladon</i> were consulted for the original description of <i>A. pseudargiolus</i> . Includes Abbot's inscription of "Argiolus." Scudder (1888-1889, Pl. 75, figs. 29, 44; Pl. 54, figs. 42, 43) copied all the larvae and pupae that he said were "formerly used in Boisduval and LeConte's iconography." Holland (1898, Pl. 5, figs. 42, 43) and Klots (1951, Pl. 6, fig. 16) reproduced some of Scudder's figures. Rogers-Price (1953) figured the entire drawing.							
17	Blanchard	<i>Calephelis virginensis</i> (Guérin-Ménéville)	Dm,Vm	37	Dm,Vm	Abbot	<i>Nymphidia Pumila</i>
NOTES: figures accompanied the original description of <i>N. pumila</i> and were combined with Abbot's figures of <i>Fenisea tarquinius</i> (Fabricius) on B&L Plate 37.							
18	Abbot	<i>Danaus plexippus</i> (Linnaeus)	Dm,Vm,L,P	40	Dm,Vm,L,P	Abbot	<i>Danais Arehippus</i>
NOTES: Rogers-Price (1953) figured the entire drawing.							
19	Abbot	<i>Danaus gilippus</i> (Cramer)	Df,Vf,L,P	39	Df,Vf,L,P	Abbot	<i>Danais Berenice</i>
NOTES: includes Abbot's inscription of "Gillippus."							
20	Blanchard	<i>Heliconius charithonia</i> (Linnaeus)	Dm,Vm	41	Dm,Vm	Blanchard	<i>Heliconia Charitonia</i>
NOTES: entire drawing was copied for B&L Plate 41 in the same layout. Based on the width of the yellow bands, the figures probably represent the Floridian subspecies <i>H. c. tuekeri</i> W. P. Comstock & F. M. Brown.							
21	Abbot	<i>Agraulis vanillae</i> (Linnaeus)	Dm,Df,Vf,L,P	42	Df,Vf,L,P	Abbot	<i>Agraulis Vanillae</i>
NOTES: drawing has penciled reference to B&L Plate 42, as well as figure legends used on the published plate. It has an attribution to Abbot in Boisduval's hand ("abbot Pinxit.") and includes Abbot's inscription of "Passiflora," probably in reference to the name <i>Papilio passiflorae</i> of Smith & Abbot (1797). This name was crossed out and Le Conte wrote "vanillae" below it. Rogers-Price (1953) figured the entire drawing.							
22	Abbot	<i>Speyeria idalia</i> (Drury)	Df,Vf	43	Df,Vf	"Leconte"	<i>Argynnis Idalia</i>
NOTES: style is consistent with Abbot, but credited to Le Conte on B&L Plate 43. Abbot is known to have illustrated this species at least one other time; a single male that was "Met with by Mr. Elliot [Stephen Elliott] in his journey to the mountains" (drawing and notes in The Natural History Museum, London). Strangely, the text in B&L did not refer to the occurrence of the species in Virginia or Georgia. References to New York and Jamaica were probably derived from Cramer ([1775]). The paper used for this drawing differs slightly from other Abbot drawings in this set, suggesting that it was original rendered for a different set.							
23	Blanchard a.	<i>Boloria selene</i> (Denis & Schiffermüller)	Df,Vf	45	Df,Vf	Blanchard	<i>Argynnis Myrina</i>
	b.	<i>Speyeria cybele</i> (Fabricius)	Df,Vf	45	Df,Vf	Blanchard	<i>Argynnis Cybele</i>
	c.	<i>Boloria belloua</i> (Fabricius)	Df,Vf	45	Df,Vf	Blanchard	<i>Argynnis Belloua</i>
NOTES: signed by Blanchard. Entire drawing was copied for Plate 45 in the same layout. The figures represent the eastern North American subspecies <i>B. s. myrina</i> (Cramer), <i>S. c. cybele</i> , and <i>B. b. belloua</i> .							
24	Abbot a.	<i>Chlosyne gorgone</i> (Hübner)	Df,Vf,L,P	46	Df,Vf,L,P	Abbot	<i>Melitaea Isueria</i>
	b.	<i>Euptoieta claudia</i> (Cramer)	Df,Vf,L,P	44	Df,Vf,L,P	Abbot	<i>Argynnis Columbina</i>
NOTES: the figures of <i>C. gorgone</i> were used for the original description of <i>M. isueria</i> (Calloun 2003) (see text). The larva in this drawing is not accurately referable to any species, but conceptually resembles that of <i>C. gorgone</i> (Calloun 2003) (also see drawing 35).							
25	Blanchard a.	<i>Euphydryas phaeton</i> (Drury)	Dm,Vm	47	Dm,Vm	Blanchard	<i>Melitaea Phaeton</i>
	b.	<i>Phyciodes batesii</i> (Reakirt)	Dm	47	Dm	Blanchard	<i>Melitaea Tharos</i>
	c.	<i>Phyciodes tharos</i> (Drury)	Dm,Vm	47	Dm,Vm	Blanchard	<i>Melitaea Tharos</i>
NOTES: signed by Blanchard. Entire drawing was copied for Plate 47 in the same layout. The published plate identified the male <i>P. batesii</i> as a female of <i>P. tharos</i> . The figures are consistent with eastern North American phenotypes.							
26	Abbot	<i>Polygonia interrogationis</i> (Fabricius)	Dm,Vm,L,P	51	Dm,Vm,L,P	Abbot	<i>Vanessa C. Aureum</i>
NOTES: includes figure numbers to be used for B&L Plate 51, but the arrangement was ultimately changed for the final plate. There is also a penciled symbol on the drawing that was probably used to instruct the engraver to position the dorsal adult figure at an angle on the plate.							

TABLE I. Continued

No.	Artist	Species depicted	Figures	B&L plate	Figures copied for B&L	Artist credited on B&L plate	B&L name
27	Abbot	<i>Junonia coenia</i> Hübner	Df,Vf,L,P	—	—	—	—
28	Abbot	<i>Junonia coenia</i> Hübner	Dm,Vm,L,P	49	Df,Vf,L,P	Abbot	<i>Vanessa Coenia</i>
NOTES: Scudder (1888-1889, Pl. 74, fig. 30; Pl. 83, fig. 66) copied the larva and pupa. Holland (1898, Pl. 4, fig. 66) reproduced Scudder's pupa.							
29	Abbot	<i>Vanessa virginiensis</i> (Drury)	Df,Vf,L,P	4S	Df,Vf,L,P	Abbot	<i>Vanessa Huntera</i>
NOTES: drawing has a penciled reference to B&L Plate 4S, as well as corresponding figure numbers and legends used on the published plate. Also includes Abbot's inscription, "Huntera."							
30	Abbot	<i>Vanessa atalanta</i> (L.)	Dm,Vf,L,P	—	—	—	—
NOTES: includes Abbot's inscription of "Atalanta."							
31	Abbot	<i>Nymphalis antiopa</i> (L.)	Dm, Vm	—	—	—	—
Notes: includes Abbot's inscription of "Antiopa." Kraus ([1964]) figured the entire drawing.							
32	Blanchard	a. <i>Roddia vaualbum</i> Denis & Schiff.	Df,Vf	50	Df,Vf	Blanchard	<i>Vanessa J. Album</i>
		b. <i>Polygonia progne</i> (Cramer)	Dm,Vm	50	Dm,Vm	Blanchard	<i>Vanessa Progne</i>
		d. <i>Aglais milberti</i> (Godart)	Dm,Vm	50	Dm,Vm	Blanchard	<i>Vanessa Milberti</i>
NOTES: signed by Blanchard. Entire drawing was copied for B&L Plate 50 in the same layout. The figures of <i>R. vaualbum</i> accompanied the original description of <i>V. j. album</i> .							
33	Abbot	<i>Limenitis arthemis</i> (Drury)	Df,Vf,L,P	53	Df,Vf,L,P	Abbot	<i>Nymphalis Ursula</i> (text), <i>Limenitis Ursula</i> (plate)
NOTES: depicts the subspecies <i>L. arthemis astyanax</i> (Fabricius). The text and plate were issued separately in B&L, accounting for the different genera used.							
34	Blanchard	<i>Limenitis arthemis</i> (Drury)	Dm,Vm,Df	54	Dm,Vm,Df	Blanchard	<i>Nymphalis Arthemis</i> (text), <i>Limenitis Arthemis</i> (plate)
NOTES: signed by Blanchard. Depicts the subspecies <i>L. a. arthemis</i> (Df) and possibly the more western subspecies <i>L. a. rubrofasciata</i> (Barnes & McDunnough) (Dm, Vm). The text and plate were issued separately in B&L, accounting for the different genera used.							
35	Abbot	<i>Asterocampa clyton</i> (B&L)	Dm,Vm,L,P	—	—	—	—
NOTES: the larva and pupa in this drawing are incorrect for this species. In his notes (Harvard), Scudder wrote, "butterfly <i>clyton</i> , but the larva & chry. couldn't belong to it." Although the larva is not an accurate depiction of any species, Scudder (1888-1889) copied and identified it as <i>P. interrogationis</i> (Plate 74, fig. 27). He copied the pupa as that of <i>Polygonia comma</i> (Harris) (Pl. 83, fig. 39). Holland (1898, Pl. 3, fig. 27; Pl. 4, fig. 39) reproduced Scudder's figures and identifications. The same incorrect early stages were used for a drawing of this species in New Zealand (see drawing 24 for a similarly cryptic larva). The original description of <i>Apatura clyton</i> was accompanied by B&L Plate 56, which was copied from an Abbot hostplant drawing with accurate early stages							
36	Abbot	<i>Asterocampa celtis</i> (B&L)	Dm,Df,Vm,L,P	—	—	—	—
NOTES: includes Abbot's inscription, "Portlandia," apparently a misidentification of <i>Enodia portlandia</i> (Fabricius). In his notes (Harvard), Scudder also observed that this drawing was "marked <i>portlandia</i> ." The original description of <i>Apatura celtis</i> was accompanied by B&L Plate 57, which was copied from another Abbot drawing.							
37	Duménil	<i>Historis odius</i> (Fabricius)	Dm,Vm	52	Dm,Vm	Blanchard	<i>Aganisthos Orion</i>
NOTES: includes a penciled reference to B&L Plate 52, as well as figure numbers and legends for the published plate. Although the plate credits Blanchard, a handwritten notation by Boisduval on the drawing attributes it to Duménil ("Dumenil Pinxit."). It is interesting that Boisduval used the genus <i>Prepona</i> on this drawing and referred to <i>Prepona</i> in livraison 22 of B&L, believed published in 1835. However, Boisduval is credited with authoring this genus in Boisduval (1836) (see Cowan 1969). The figures represent the continental subspecies <i>H. o. orion</i> (Fabricius), which also occurs in the Lesser Antilles.							
38	Abbot	<i>Libytheana carinenta</i> (Cramer)	Dm,Vm,L,P	—	—	—	—
NOTES: B&L Plate 64 of <i>Libythea motya</i> was copied from an Abbot hostplant drawing with duplicate early stages, but the adults were evidently derived from a specimen in Boisduval's collection (see text). Scudder (1888-1889, Pl. 84, fig. 24) copied the pupa, which was reproduced by Holland (1898, Pl. 5, fig. 24). See Figs. 29, 30.							
39	Abbot	a. <i>Enodia creola</i> (Skinner)	Dm	—	—	—	—
		b. <i>Enodia portlandia</i> (Fabricius)	Df,Vf	—	—	—	—
NOTES: Abbot incorrectly associated the male of <i>E. creola</i> with the female of <i>E. portlandia</i> . An Abbot hostplant drawing that correctly associated the male and female of <i>E. portlandia</i> was copied for B&L Plate 58.							

TABLE 1. Continued

No.	Artist	Species depicted	Figures	B&L plate	Figures copied for B&L	Artist credited on B&L plate	B&L name
40	Blanchard	<i>Satyrodes appalachia</i> (R. L. Chermock)	Dm,Df,Vm,Vf	60	Df,Vf,Dm,Vm	Blanchard	<i>Satyrus Canthus</i>
<p>NOTES: signed by Blanchard. Entire drawing was copied for B&L Plate 60 in the same layout. <i>Satyrodes appalachia</i> was not recognized as a separate species from <i>Satyrodes eurydice</i> (Johansson) [=Satyrus canthus (L.)] until 1970. The figures represent the southeastern nominate subspecies.</p>							
41	Abbot	a. <i>Hermeuptychia sosybius</i> (Fabricius)	Dm,Df,Vm,L,P	63	Dm,Vm,L,P	Blanchard	<i>Satyrus Sosybius</i>
		b. <i>Neonympha areolatus</i> (J. E. Smith)	Df,Vf,L,P	63	Df,Vf,L,P	Blanchard	<i>Satyrus Areolatus</i>
<p>NOTES: Scudder (1888-1889, Pl. 83, fig. 11) copied the pupa of <i>N. areolatus</i>, which was reproduced by Holland (1898, Pl. 4, fig. 10).</p>							
42	Abbot	a. <i>Achalarus lyciades</i> (Geyer)	Df,Vm,L,P	71	Df,Vm,L,P	Abbot	<i>Eudamus Lycidas</i>
		b. <i>Epargyreus clarus</i> (Cramer)	Dm,Vm,L,P	72	Dm,Vm,L,P	Abbot	<i>Eudamus Tityrus</i>
<p>NOTES: includes Abbot's inscriptions, "<i>Lycidas</i>" for <i>A. lyciades</i> and "<i>Tytirus</i>" (a misspelling of the synonym <i>tityrus</i> Fabricius) for <i>E. clarus</i>.</p>							
43	Abbot	<i>Urbanus proteus</i> (Linnaeus)	Dm,Vm,L,P	69	Dm,Vm,L,P	Abbot	<i>Eudamus Proteus</i>
<p>NOTES: includes Abbot's inscription, "<i>Proteus</i>."</p>							
44	Le Conte?	<i>Megathymus yuccae</i> (B&L)	larva only	—	—	—	—
<p>NOTES: drawing is likely by J. E. Le Conte (see text). In 1876, entomologist Charles V. Riley published the life history of this species. In Scudder's notes (Harvard) there is a sketch of this figure, which Scudder later sent to Riley and asked, "is this <i>Megathymus yuccae</i>?", to which Riley replied, "without doubt!" <i>Eudanus yuccae</i> was first "described" (no textual reference) from an Abbot hostplant drawing on B&L Plate 70.</p>							
45	Blanchard	a. <i>Calpodus ethlius</i> (Stoll)	Dm,Vm	75	Dm,Vm	Blanchard	<i>Eudamus? Olynthus</i>
		b. <i>Polites vibex</i> (Geyer)	Df(2),Vf	75	Df(2),Vf	Blanchard	<i>Hesperia Brettus</i>
<p>NOTES: signed by Blanchard. Entire drawing was copied in the same layout for B&L Plate 75, which included the original "descriptions" (no textual references) of <i>E. olynthus</i> and <i>H. brettus</i>. Boisduval apparently considered the sexes of <i>P. vibex</i> to be analogous, as figures 3 & 4 of dorsal and ventral females were both identified as males on B&L Plate 75.</p>							
46	Abbot	<i>Problema bulenta</i> (B&L)	Dm,Df,Vm,L,P	67	Dm,Df,Vm,L,P	Abbot	<i>Hesperia Bulenta</i>
<p>NOTES: figures copied for B&L Plate 67, the original "description" (no textual reference) of <i>H. bulenta</i>. In his notes for another drawing of <i>P. bulenta</i> in New Zealand, Abbot wrote, "Feeds on the Broad grass, <i>Zozani aquatica</i> folding itself up in the leaf changed 25th bred 6th Aug't. Frequents Rice fields, ditches, and the sides of ponds in the lower parts of Georgia is not common." The species was not rediscovered until 1925. Abbot probably collected his specimens near the mouth of the Savannah River where the species still occurs today.</p>							
47	Abbot	a. <i>Hylephila phyleus</i> (Drury)	Dm,Df,Vm,L,P	78	Dm,Df,Vm,L,P	Abbot	<i>Hesperia Phyleus</i>
		b. <i>Wallengrenia otho</i> (J. E. Smith)	Dm,Df,Vm,L,P	77	Dm,Df,Vm,L,P	Abbot	<i>Hesperia Otho</i>
<p>NOTES: Scudder (1888-1889, Pl. 77, figs. 19, 34; Pl. 85, figs. 39, 42) copied all the larvae and pupae. The pupae were reproduced by Holland (1898, Pl. 6, figs. 39, 42).</p>							
48	Blanchard	a. <i>Wallengrenia egeremet</i> (Scudder)	Dm,Df	—	—	—	—
		b. <i>Wallengrenia otho</i> (J. E. Smith)	Vf	—	—	—	—
		c. <i>Poanes zabulon</i> (B&L)	Df,Vf	—	—	—	—
		d. <i>Amblyscirtes aesculapias</i> (Fabricius)	Dm,Vm	—	—	—	—
<p>NOTES: signed by Blanchard. Drawing predates the description of <i>W. egeremet</i>, which until recently was generally treated as conspecific with <i>W. otho</i>. A penciled circle around the <i>Wallengrenia</i> figures and the notation "replacer" [replace] suggests that Boisduval was going to copy them for B&L, but instead used those from Abbot's drawing 47.</p>							
49	Blanchard	a. <i>Nastra lherminier</i> (Latrielle)	Df	—	—	—	—
		b. <i>Polites origenes</i> (Fabricius)	Df	—	—	—	—
		c. <i>Polites themistocles</i> (Latrielle)	Vf	—	—	—	—
		d. <i>Atalopedes campestris</i> (Boisduval)	Dm,Vm	—	—	—	—
		e. <i>Poanes yehl</i> (Skinner)	Dm,Vm	—	—	—	—
<p>NOTES: signed by Blanchard. Females of up to three different species are associated in this drawing (probably Boisduval's misidentification). The second dorsal female may represent <i>P. themistocles</i>, but it cannot be identified with certainty. The figures of <i>A. campestris</i> represent the subspecies <i>A. c. huron</i> (W. H. Edwards).</p>							
50	Blanchard	a. <i>Anatrytone logan</i> (W. H. Edwards)	Dm,Df,Vf	-	-	-	-
		b. <i>Polites peckius</i> (W. Kirby)	Dm,Vm	-	-	-	-
<p>NOTES: signed by Blanchard. The figures of <i>A. logan</i> are consistent with the nominate subspecies from eastern North America.</p>							

TABLE 1. Continued

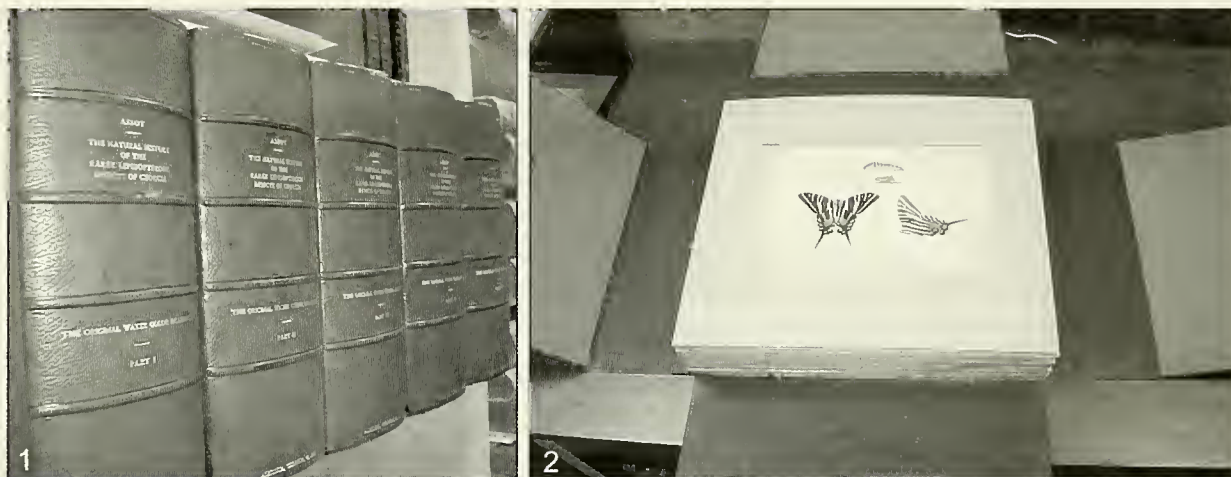
No.	Artist	Species depicted	Figures	Figures		Artist	
				B&L plate	copied for B&L	credited on B&L plate	B&L name
51	Blanchard	a. <i>Polites themistocles</i> (Latreille)	Dm,Vm	76	Dm,Vm	Blanchard	<i>Hesperia Cernes</i>
		b. <i>Atrytone arogos</i> (B&L)	Dm,Df,Vm	76	Dm,Df,Vm	Blanchard	<i>Hesperia Arogos</i>
		c. <i>Poanes zabulon</i> (B&L)	Dm,Vm	76	Dm,Vm	Blanchard	<i>Hesperia Zabulon</i>
NOTES: signed by Blanchard. Entire drawing copied for Plate 76 in the same layout and used for the original "descriptions" (no textual references) of <i>H. cernes</i> , <i>H. arogos</i> and <i>H. zabulon</i> . See Fig. 5. The figures of <i>A. arogos</i> represent the nominate subspecies from eastern North America.							
52	Blanchard	a. <i>Polites baracoa</i> (Lucas)	Dm,Vm	—	—	—	—
		b. <i>Wallengrenia ophites</i> Mabilie	Dm,Vm	—	—	—	—
NOTES: drawing depicts two West Indian species. The <i>P. baracoa</i> figures may represent the Hispaniolan subspecies <i>P. b. loma</i> Evans.							
53	Blanchard	a. <i>Euphyes vestris</i> (Boisduval)	Dm,Df,Vf	—	—	—	—
		b. <i>Lerema accius</i> (J. E. Smith)	Dm,Df,Vf	—	—	—	—
		c. <i>Oligoria maculata</i> (W. H. Edwards)	Dm,Vm	—	—	—	—
NOTES: signed by Blanchard. Illegible notations, scrawled in Boisduval's hand, are partially cut off in the right margin. The figures of <i>E. vestris</i> are consistent with the eastern North American subspecies <i>E. v. metacommet</i> (Harris).							
54	Blanchard	a. <i>Panoquina ocola</i> (W. H. Edwards)	Dm,Df,Vm	—	—	—	—
		d. <i>Pholisora catullus</i> (Fabricius)	Dm,Df,Vm	—	—	—	—
NOTES: signed by Blanchard.							
55	Abbot	a. <i>Erynnis brizo</i> (B&L)	Dm,Df,Vm,L,P	—	—	—	—
		b. <i>Erynnis juvenalis</i> (Fabricius)	Dm, Df, Vm	65	Dm, Df, Vm	Abbot	<i>Thanaos Juvenalis</i>
NOTES: includes Abbot's inscription, " <i>Juvenalis</i> " (for <i>E. juvenalis</i>). The identities of the sexes of the dorsal figures of <i>E. juvenalis</i> were reversed on B&L Plate 65. <i>Thanaos brizo</i> was originally "described" (no textual reference) from B&L Plate 66, which was copied from an Abbot host plant drawing with duplicate figures and a hostplant. A penciled circle drawn around the figures of <i>E. brizo</i> suggests Boisduval was going to copy them for B&L, but instead used the other Abbot drawing. Scudder (1888-1889, Pl. 77, fig. 18; Pl. 85, fig. 38) copied the larva and pupa of <i>E. brizo</i> , which were reproduced by Holland (1898, Pl. 6, fig. 38).							

drawings at the University of South Carolina depict butterflies. Forty include figures that were reproduced on 44 of the 78 plates in Boisduval & Le Conte (1829-[1837]), hereafter referred to as B&L. The butterfly determinations and information about the corresponding published plates are presented in Table 1. Nomenclature follows Opler & Warren (2002). The butterfly drawings portray a total of 80 species and most include multiple species (Figs. 3-5, 10, 36). The 94 moth drawings in this set are still under review.

The drawings at the University of South Carolina were rendered on cream-colored wove paper and measure approximately 27 cm x 16.5 cm. They are mounted on stiff paper backing, matted, and contained in six blue half-morocco portfolio cases with gilt lettering that incorrectly identify them as the original drawings for Smith & Abbot (1797) (Figs. 1, 2). The portfolio cases were created by rare book firm H. P. Kraus of New York, who sold the drawings to the University of South Carolina in 1964 (Calhoun 2003). The drawings by John Abbot were rendered in a horizontal format, with figures of early stages positioned above the adults (Figs. 2, 3, 4, 10, 36). When J. E. Le Conte commissioned Abbot for these drawings in 1813, he requested that hostplants be

omitted (Rogers-Price 1983). The drawings by Blanchard and Duménil were mostly rendered in a vertical format, do not include early stages, and depict only one half of dorsal adults. Nearly all of Blanchard's drawings have a penciled outline around the figures and are signed, "E. Blanchard, pit." (Figs. 5, 5a). Blanchard's artistic style was highly refined and true to life. Although Abbot's figures were rearranged for the plates in B&L, virtually all of the published drawings by Blanchard and Duménil were reproduced in their original layouts.

One drawing in this set portrays only the mature larva of *Megathymus yuccae* (Boisduval & Le Conte) with copious annotations in Latin and French by J. E. Le Conte (Table 1). It was drawn on a smaller piece of paper that was pasted onto a larger sheet. The style of this drawing is similar to smaller drawings of moth larvae in this set, most of which were probably rendered by Le Conte (Calhoun 2003). This is supported by the notes of John Abbot, who credited Le Conte (as "Mr. Le Compt") for discovering the larva of *M. yuccae*. In Boisduval et al. (1832-1837), Boisduval wrote about caterpillar drawings that he had received from New York and Savannah, obviously referring to Le Conte (from New York) and Abbot (who lived for a time in Savannah, Georgia). Boisduval



FIGS. 1-2. Portfolio cases of original drawings in the Thomas Cooper Library, University of South Carolina. 1, Five of the six cases. 2, Case 1 opened to show the matted illustrations (Abbot's drawing 2 of *E. marcellus* is visible). (photos courtesy of Thomas Cooper Library)

(1836) also noted that Le Conte had executed as many caterpillar drawings as Abbot.

The drawings at the University of South Carolina are numbered in pencil and loosely arranged in taxonomic order. Most have notations that were written by Boisduval and/or Le Conte, including names used in B&L. Although I previously suspected that the majority of the inscriptions on these drawings were by Boisduval (Calhoun 2003), I have since confirmed through additional writing samples that Le Conte was responsible for many names and other notations (Fig. 6). Samuel H. Scudder examined these drawings while they were still in Boisduval's possession and also observed that, "in some of Abbot's drawings which Dr. Boisduval received from Major LeConte is a memorandum by the latter" (Scudder 1888-1889). "Nobis," or more often the abbreviation "nob.," follows many of the species names. This Latin term loosely means "of us" or "of me" and was used to claim authorship of new names. Ten of the drawings possess penciled references to the corresponding B&L plates ("planches" in French) (e.g., "Pl. 1") (Table 1, Fig. 10). Some individual figures are numbered (Fig. 6) and three drawings even include the complete figure legends used on the published plates. On several drawings, Abbot inscribed the same Latin names employed in Smith & Abbot (1797). The source of other inscriptions is not readily identifiable.

Many of the drawings by Abbot that were copied for published plates show alterations, particularly to the legs and bodies of adults. Referring to this set of drawings, Oberthür (1920) complained that Abbot's legs and bodies were more fantasy than reality. In the preface to B&L livraison 10, Boisduval addressed criticisms from subscribers about the inaccuracy of

various published figures, particularly relating to poorly formed bodies and legs. In a statement under the heading "Avis de L'un des Auteurs" [Opinion of One of the Authors], Boisduval promised to retouch Abbot's drawings and that beginning with livraison 10 the published figures would no longer exhibit these defects (an imprecise translation in Calhoun (2003) suggested the engravings were altered). The retouched drawings in South Carolina were used for plates issued after livraison 10, further supporting this connection. The style of the alterations closely matches that of Blanchard, who was probably instructed by Boisduval to improve and standardize the figures for the engravers.

When S. H. Scudder visited Boisduval, probably in 1871, he sketched at least 23 of Abbot's larvae and pupae in these drawings. Scudder (1888-1889) published these facsimiles, some of which were later reproduced by Holland (1898) and Klots (1951) (Table 1). The auction catalog of Sotheby & Co. (1963) figured an entire moth drawing from this set (no. 106). Kraus ([1964]) and Rogers-Price (1983) figured five butterfly drawings (nos. 31 and 3, 16, 18, 21, respectively).

Missing drawings. Published Plates 4-11, 19, and 20 were copied from missing Abbot drawings that were probably rendered in the same format as those in South Carolina. Oberthür (1920) also feared that several original drawings from this set were lost. One such drawing, depicting *Eurema lisa* Boisduval & Le Conte, was used for B&L Plate 19 and apparently also for figures of the early stages of this species in Boisduval (1836, Pl. 2).

There are fifteen plates from Abbot in B&L that included sizable hostplants (nos. 32, 37, 55-59, 61, 62,



FIGS. 3-12. Original drawings and published plates. B&L = Boisduval & Le Conte (1829-[1837]). 3, John Abbot's drawing 3° of *S. liparops* and *C. henrici*. 4, Abbot's drawing 11° of *C. niphon*, *S. titus*, and *C. gryneus*. 5, Blanchard's drawing 51° of *P. themistocles*, *A. arogos*, and *P. zabulon* used for B&L Plate 76. 5a, Blanchard's signature. 5b, Notation crediting Abbot for B&L Plate 64. 6, Ventral *S. liparops* from Abbot's drawing 12° (note "2" above figure); inset is "*liparops*" in Le Conte's hand. 7, Ventral female of *Thecla liparops*, B&L Plate 31, fig. 2. 8, B&L Plate 16 of *Pieris cleomes*. 9, Abbot's drawing of *A. m. phileta*, New Zealand (ref. no. E-272-f-012). 10, Abbot's drawing 7° of *A. m. phileta* (reference to "Pl. 16" at lower right) 11, Dorsal male from Abbot's drawing 7° of *A. m. phileta*. 12, Dorsal male of *P. cleomes*, B&L Plate 16. (° Thomas Cooper Library, University of South Carolina)

64, 66, 68, 70, 73, 74) (Fig. 24). The original drawings for these plates are also missing, but Scudder (1888, 1888-1889) noted that he obtained from Boisduval "three series of manuscript notes entitled 'Notes to the Drawings of Insects,' all written in Abbot's own hand, and comprising twenty-seven foolscap pages, rather closely written, and describing the changes of two hundred and one species; of these thirty-eight are butterflies." Scudder donated these notes in 1903 to the Boston Society of Natural History. In 1946, Harvard University obtained them as part of a larger acquisition that also included approximately 600 original Abbot drawings owned by the Society. I obtained a copy of these notes, which are now deposited in the Houghton Library. The three sets of notes were segregated by Abbot as "a," "b," and "c." Written on the cover sheet in Scudder's hand is "Given me by Dr. Boisduval SHS." These notes include entries that correspond to species portrayed with hostplants in B&L. Abbot must have presented these drawings to Le Conte, who then passed them to Boisduval along with Abbot's drawings now in South Carolina.

These missing hostplant drawings (depicting both insects and hostplants) probably also account for

abbreviated plants found in other plates in B&L. Plates 16, 18, 22, 25-30 included hostplant leaves or small sprigs, which served as substrates for figures of larvae and pupae (Figs. 8, 15). P. Duménil was the master engraver for the first 30 plates in B&L, including the nine with abbreviated hostplants. He apparently created two of these (nos. 16, 22) by combining Abbot's figures in South Carolina with portions of plants from Abbot's missing hostplant drawings. Pencil references to these two published plates are found on drawings in South Carolina (nos. 7, 9) and the plants match those in other surviving Abbot drawings. For four of the remaining seven plates that have no equivalent drawings in South Carolina (nos. 18, 25, 28, 29), Duménil must have derived the illustrations from the missing hostplant drawings, but reproduced only fragments of the plants to remain consistent with his other plates. The plant in Plate 30 (Fig. 15) appears to have been copied from an illustration in Smith & Abbot (1797) (see Discussion). It was not until Duménil was replaced by another engraver, known simply as Borromée, that Abbot's hostplant drawings were reproduced in their entirety. Whereas Duménil and his association with Boisduval are fairly well understood (see Cowan 1969),

TABLE 2. Entries from John Abbot's notes (Harvard University) that correspond to hostplant plates in Boisduval & Le Conte (1829-[1837]) (= B&L). Grammar and spelling are as given in the original notes. Asterisks (*) denote entries that were assigned to plates from limited information.

B&L plate	Species depicted	Set and entry number	Notation
16	<i>Ascia monuste</i> (L.)	b.6	"White Butterfly. Danaï Cleome. Feeds on the <i>Cleome pentaphylles</i> . changed 17th July, bred 23rd July. nearly half of the female Butterflies varies being of a Dingy colour, as figured, They are generally rare, but some years at intervals are very plenty in the lower parts of the County; I am indebted for the discovery of the caterpillar of this Species to my friend Mr. Oemler, who first found it in his garden in Savannah."
18	<i>Eurema daira</i> (Godart)	b.S	"Black streaked little yellow Butterfly. Feeds on the <i>Cassia Arameicrista</i> . Tied itself up 27th Aug't changed 28th bred 5th Sep'r. Both these kinds [this and <i>Eurema lisa</i> Boisd. & Le Conte; prior entry in notes] is common in all parts of the County in Autumn, and settles so many together at times to suck moist places on the ground, that I have seen 20 in the compass of a hat."
22	<i>Zerene cesonia</i> (Stoll)	a.30	"Clouded yellow Butterfly. Feeds on the Plant figured. Tied up 18th April, changed 19th bred 2nd May, continues to breed all the Summer and Autumn, Is most common in the pine woods, often settles several together to suck the moist places in roads, and other places."
25	<i>Atlides halesus</i> (Cramer)	c.7	"Great Purple hair Streak. Feeds on the Willow Oak, <i>Quercus phellos</i> . Tied itself up 18th Aug't changed 20th bred 6th Sep'r is not common."

TABLE 2. Continued

B&L plate	Species depicted	Set and entry number	Notation
28	<i>Strymon melinus</i> (Hübner)	c.8	"Red spotted hair streak Butterfly. Feeds on the Flower figured, Parsley Haw, pine, Snap beans etc. Tied up 28th April, changed 20th bred 14th May. Is not very common."
29	<i>Satyrrium calanus</i> (Hübner)	b.17	"Black hair streak Butterfly. Feeds on the Parsley Haw, and Oaks and Hickory. Tied up 25th April, changed the 28th bred 10th May. The Butterfly frequents Clinquepin blossoms and is not uncommon in the oak woods."
32	<i>Callophrys irus</i> (Godart)	c.9°	"Little Brown Butterfly. Feeds on the plant figured etc. Tied up 20th June, changed 22nd bred 20th March. is very rare."
37	<i>Feniseca tarquinius</i> (Fabricius)	a.37	"Orange Butterfly. Feeds on the Wild Currant Tree, and Alder, the Caterpillar is partly covered with a white loose down, Tied up 12th April, changed 14th bred 25th. The Butterfly frequents Swamps. is rare."
55	<i>Limenitis archippus</i> (Cramer)	a.25, c.2	"Black veined orange Butterfly. Feeds on Willow. Tied up 30th July, changed the 31st bred 7th August. neither the Caterpillar or Butterfly is very common, most frequent near Savannah" [a.25]. "Black veined Orange Butterfly. Feeds on the Plant figured; and Willow mostly. Tied up 30th July, changed into Chrysalis the 31st bred 7th August. Is not very common" [c.2; this is probably the entry for the drawing used by B&L].
56	<i>Asterocampa clyton</i> (Boisduval & Le Conte)	a.27°	"Orange brown Butterfly. Feeds on the plant figured, Tied up 16th May changed 17th bred 2nd June. Is a rare species" [° common name is comparable to "Orange coloured Butterfly" for <i>A. clyton</i> drawing in New Zealand; the dates are also similar].
57	<i>Asterocampa celtis</i> (Boisduval & Le Conte)	a.29	"Sugar berry Butterfly. Feeds on the Sugar berry (or Hack berry), Tied up 23rd May, changed 24th, bred 12 June. Is a rare Species."
58	<i>Enodia portlandia</i> (Fabricius)	a.31°	"Reed Butterfly. Feeds on Reeds, Tied up 16 June, changed 17th bred 25th mostly frequents Swamps in different parts of the County, but is not a common species."
59	<i>Cercyonis pegala</i> (Fabricius)	b.9	"Great Meadow brown Butterfly. Feeds on the grass figured, and other grasses. Tied up 19th June changed 20th bred 5th July. Frequents the pine woods etc. is not common."
61	<i>Megisto cymela</i> (Cramer)	a.32°	"Ringleet Butterfly. Feeds on the grass figured, and other grasses. Tied up 25[4]th April, changed 24[5]th bred 2nd May. Is plenty in Haumocks and the side of Branches, in most parts of the country" [° This entry does not refer to <i>Hermeuptychia sosybius</i> (Fabricius), as entry b.10 is identical to notes for a drawing of this species in New Zealand].
62	<i>Cyllopsis gemma</i> (Hübner)	c.6°	"Swamp Butterfly. Feeds on the grass figured, and other grasses. Tied up 10th April, changed 11th bred 24th. frequents Swamps and Hammocks is not common."
64	<i>Libytheana carinenta</i> (Cramer)	b.11	"Snout Butterfly. Feeds on the Sugar berry, or Hack berry, Tied up 28th April changed 29th bred 8th May. Is rare."
66	<i>Erynnis brizo</i> (Boisduval & Le Conte)	a.33	"Lesser Dingy Skipper. Feeds on the Vine figured, Wild Indigo, and Oaks, spun up last Oct, changed into Chrysalis in March, bred 21st April, Is not so common as the larger kind."

TABLE 2. Continued

B&L plate	Species depicted	Set and entry number	Notation
6S	<i>Euphyes arpa</i> (Boisduval & Le Conte)	c.4°	"Georgia Skipper Butterfly. Feeds on the grass figured, and other grasses, Spun up 25th April, Frequents the sides of Ponds in the pine Woods, is rare" [dates and habitat are consistent with <i>E. arpa</i> ; hostplant on the B&L plate is giant whitetop, <i>Rhynchospora latifolia</i> (Baldwin) W. W. Thomas (Cyperaceae)-a "grass" to Abbot. This skipper normally feeds on saw palmetto, <i>Serenoa repens</i> (Bartr.) Small (Palmae), but Mimmo (1994) reared it in the lab on a species of Cyperaceae, suggesting Abbot could also have reared it on the sedge. Abbot may have considered <i>E. arpa</i> and <i>Euphyes pilatka</i> (W. H. Edwards), which feeds on <i>Cladium jamaicense</i> Crantz (Cyperaceae), to be the same species. Nonetheless, the adults and pattern on the head capsule of the larva in the published plate are consistent with <i>E. arpa</i>].
70	<i>Megathymus yuccae</i> (Boisduval & Le Conte)	a.45	"Great Georgia Skipper Butterfly. Lives and feeds on the heart and bud of the Bear grass or Wild Aloe, closing the top together with a web, and in which its changes into Chrysalis, one which changed the 17th May, was bred the 20th June. Those that changes in Autumn lives in Chrysalis in the Aloe all winter, coming out the last of March & April, is rare but most frequent in the lower parts of the County. I am indebted to Mr. Le Compte for the discovery of the Caterpillar and manner of living of this rare and elegant Species. The Chrysalis is covered with a kind of powder similar to the Underwing Moths." [the dorsal female on B&L Plate 70 represents <i>Megathymus cofaqui</i> (Strecker)].
73	<i>Autochton cellus</i> (Boisduval & Le Conte)	c.3	"Barr'd Skipper Butterfly. Feeds on the Convolvulus figured, spun up 4th April, bred 25th . Frequents the sides of Swamps, is rare."
74	<i>Thorybes bathyllus</i> (J. E. Smith)	b.12	"Brown Skipper. Feeds on the Beggars lice, spun up in the leaves 15th Oct'r bred 20th April, is not very common."

Borromée is obscure. Even his full name is unknown. He was an Italian artist and engraver active in France during the first half of the 19th century and worked as a natural history illustrator for the Muséum National d'Histoire Naturelle in Paris where some of his artwork is currently deposited (Meissner 1996). Borromée also served as the master engraver for Boisduval (1836).

I compared the three sets of Abbot's notes at Harvard with other notes that he prepared for his drawings now in London (Scudder 1872, 1888-1889) and New Zealand, and have identified entries for 21 of the 24 missing hostplant drawings used for plates in B&L (Table 2). Two of these drawings were copied for plates that accompanied the original descriptions of *Apatura clyton* Boisduval & Le Conte (= *Asterocampa clyton*) (Plate 56) and *Apatura celtis* Boisduval & Le Conte (= *Asterocampa celtis*) (Plate 57). Four drawings were copied for plates that represent the "original descriptions" (no accompanying text) of *Thanaos brizo* Boisduval & Le Conte (= *Erynnis*

brizo) (Plate 66), *Hesperia arpa* Boisduval & Le Conte (= *Euphyes arpa*) (Plate 68), *Eudamus yuccae* Boisduval & Le Conte (= *Megathymus yuccae*) (Plate 70), and *Eudamus cellus* Boisduval & Le Conte (= *Autochton cellus*) (Plate 73). Abbot's accompanying notes help to fill the void where no text was provided for these published plates.

The host leaves in Plates 26 and 27 are unaccounted for. Ironically, both plates portray *Parhassius m-album* Boisduval & Le Conte and do not have corresponding entries among Abbot's notes at Harvard. The figures of *P. m-album* on drawing 10 in South Carolina are numbered, indicating that all the figures on Plate 27 were copied from this rendering. The leaf on this plate is crude and looks to have been created by Duménil merely to improve composition. There is also no appropriate entry for Plate 30 that combined figures of two species under the name of *Thecla favonius* (J. E. Smith) (see Discussion). By comparing notes from surviving sets of Abbot drawings, I verified that the remaining butterfly entries refer to species not

treated in B&L.

Artists responsible for the published plates. The plates in B&L included small printed notations that credited the original drawings to Abbot, Blanchard, Duménil, or Le Conte (Fig. 5b). Following the name of each artist was printed "pinx." or "pinxit," from the Latin meaning "painted by." Based on these notations, Rogers-Price (1983) attributed 62 plates to Abbot, whereas Gilbert (1998) listed 65. dos Passos (1962) seemingly misunderstood the notations, believing 62 plates were merely "coloured by Abbot." I examined the plates from the copy of B&L once owned by dos Passos (Wittenberg University, Ohio) and confirmed that 62 plates credited Abbot (nos. 1-20, 22, 24-29, 31-34, 36, 37, 39, 40, 42, 44, 46, 48, 49, 51, 53, 55-59, 61, 62, 64-74, 77, 78). Twelve plates credited Blanchard (nos. 35, 38, 41, 45, 47, 50, 52, 54, 60, 63, 75, 76), three credited Duménil (nos. 21, 23, 30), and one credited Le Conte (no. 43). For Plates 1-8 and 10-30 Duménil misspelled Abbot as "Abbott." With the exception of Plates 36 and 37 where "Obbit" was given, Borromée spelled the name correctly (Table 1).

As demonstrated by the drawings in South Carolina, as well as other original and published illustrations by Abbot, the wrong artist was credited on seven plates (nos. 3, 14, 15, 17, 43, 52, 63) (Table 1). Fifty-seven plates can be wholly attributed to Abbot (nos. 1, 2, 4-13, 16, 18-20, 22, 24-29, 31-33, 36, 39, 40, 42-44, 46, 48, 49, 51, 53, 55-59, 61-63, 65-74, 77, 78). Two plates from Abbot (nos. 34, 37) also included figures from Blanchard. Two plates (nos. 30, 64) were largely derived from Abbot, but included adult figures that were evidently derived from specimens in Boisduval's collection (see Discussion). Ten plates were from Blanchard (nos. 35, 38, 41, 45, 47, 50, 54, 60, 75, 76). Seven plates were most likely from Duménil (nos. 3, 14, 15, 17, 21, 23, 52).

DISCUSSION

The origin of figured specimens. Figures for nine of the 29 original descriptions in B&L were from drawings by Émile Blanchard (Table 1). This finding complicates historical notions about the type localities of five taxa: *Eudamus olynthus* Boisduval & Le Conte, *Hesperia brettus* Boisduval & Le Conte, *Hesperia cernes* Boisduval & Le Conte, *Hesperia arogos* Boisduval & Le Conte, and *Hesperia zabulon* Boisduval & Le Conte. No text accompanied Plates 75 and 76, but based on the belief that the published figures were from John Abbot, Bell (1938) and Miller & Brown (1981) assigned these taxa the type locality of "Georgia." Such assumptions are no longer

appropriate.

Abbot usually drew insect specimens that he reared and collected himself, but he occasionally illustrated specimens obtained from other local naturalists, particularly pharmacist Augustus G. Oemler of Savannah, Georgia, and botanist Stephen Elliott of South Carolina. Abbot provided many plant specimens for Elliott's herbarium and exchanged a set of insect watercolors for specimens that Elliott had personally obtained in Georgia and South Carolina (Rogers-Price 1983, Gilbert 1998). Specimens collected by Abbot were dispersed to many European naturalists during the late 18th and early 19th centuries, mostly through London jeweler John Francillon. Swainson (1840) observed that Abbot's insects "were always sent home expanded, even the most minute." At least some specimens were labeled "Georgia" in Abbot's own hand (Calloun 2003). Many of these specimens found their way into various museums, but it is impossible to know if any were used as models for his drawings.

On the other hand, Blanchard and Duménil undoubtedly drew specimens contained in the extensive collection of Boisduval, who obtained them from multiple sources. Boisduval (1836) wrote that he had received from Le Conte an immense quantity of species from North America. In turn, some specimens that Le Conte gave to Boisduval came from Thaddeus W. Harris (Scudder 1869) and Abbot. In B&L, Boisduval noted that a specimen "nous a été envoye par Abbot" [has been sent to us by Abbot]. Harris also had specimens from Abbot, now deposited in the Museum of Comparative Zoology, Harvard University. Boisduval possessed Abbot specimens, but it may be difficult to establish that Blanchard and Duménil used any of them as subjects for their drawings. Six unused drawings by Blanchard in South Carolina (nos. 48, 49, 50, 52, 53, 54) were probably prepared for the planned continuation of B&L. To better understand the origin of figured specimens in Blanchard's drawings, I have identified the applicable subspecies in Table 1 where possible.

Four plates attributed to John Abbot in B&L portrayed butterflies that he certainly never encountered in Virginia or Georgia. Harris (1972) wondered how Abbot was able to obtain specimens of these exotic species. Unfortunately, only one of the original drawings for these plates is included in the set in South Carolina. Three plates portray West Indian species: *Eurytides celadon* (Lucas) (as *Papilio sinon*, Pl. 3), *Battus devilliersii* (Godart) (as *Papilio villersii*, Pl. 14), and *Battus polydamas* (L.) (as *Papilio polydamas*, Pl. 15). The text did not mention Virginia

or Georgia within the ranges of these species. Although *B. polydamas* is a resident of Florida that occasionally strays into Georgia (Harris 1972), and Boisduval (1836) dubiously stated that the species was very common in Georgia, the plate in B&L actually depicted the distinctive subspecies *B. p. neodamas* (Lucas) that occurs only on the Lesser Antilles islands of Guadeloupe and Marie-Galante. These islands were under French control during most of the late 18th and early 19th centuries. The most unusual species treated in B&L is the Asian *Leptosia nina* (Fabricius) (as *Pieris chlorographa*) (Plate 17, figs. 4, 5). Boisduval hesitantly included this butterfly, as he was uncertain that the two specimens he possessed actually came from North America. He soon rectified this error, admitting "C'est par erreur, et sur la foi d'Hubner, que nous avons figuré cette variété dans notre Iconographie... nous avons maintenant la certitude qu'elle vient de l'île de Java" [it is by mistake, and on the faith of Hübner, that we have figured this variety in our Iconography... we are now certain that it comes from the island of Java] (Boisduval 1836). Obviously, Abbot did not collect the figured specimens, nor have I found evidence that he received such specimens to illustrate from Boisduval, Le Conte, or anyone else. Although Abbot obtained specimens from New England during his residency in America (Remington 1945), it does not appear that he ever drew Lepidoptera that originated from anywhere outside the region extending from Virginia to Georgia.

In all probability, these four plates that included extralimital species were created entirely by Duménil, who engraved five of the six plates in B&L that included Neotropical and Asian species (Pls. 3, 14, 15, 17, 23). He was also credited as the artist for Plate 23 of *Anteos maerula* (Fabricius). Although Borromée engraved the sixth plate, *Historis odius* (Fabricius) (Pl. 52), it was based on drawing 37 in South Carolina that Boisduval attributed to Duménil (Table 1). Drawing 4 in South Carolina of *E. celadon* (for Plate 3) is probably also by Duménil (Table 1). All six plates that included tropical species should tentatively be credited to Duménil. Because only two drawings for these plates survive, Duménil may have engraved the remaining three plates directly from Boisduval's specimens. The same can be said for Plate 21 that included figures for the original description of *Colias pelidne* Boisduval & Le Conte. This plate credited Duménil as the artist and no corresponding original figures are included among the drawings in South Carolina. Boisduval (1836) noted specimens of this species in his personal collection at the time the plate was created. Duménil also provided the original

drawings and served as the master engraver for many of the plates in Dejean & Boisduval (1829-1837) and Boisduval et al. (1832-1837).

The figures for the original description of *Pieris protodice* Boisduval & Le Conte (= *Pontia protodice*) (Plate 17, figs 1-3) were portrayed on the same plate as *L. nina* and credited to Abbot. However, the text referred to the occurrence of this species only in New York and Connecticut. Boisduval (1836) again placed this species further north when he stated that it had been found in the vicinity of New York and Philadelphia. A drawing in The Natural History Museum, London, reveals that Abbot also encountered this species in Georgia, but he considered it "very rare" and noted only a single capture on 13 May. This drawing depicts the dorsal and ventral surfaces of a single female, rather than a dorsal male, dorsal female, and ventral female as portrayed on the B&L plate. The dorsal figures on the plate were also engraved with disproportionately small hindwings, an unlikely result if they had been copied from an Abbot drawing. Like the figures of *L. nina* on the same plate, Duménil probably derived those of *P. protodice* from specimens in Boisduval's collection.

Miller & Brown (1951) were unaware of a supposed type of *P. protodice*, but a male of this species was discovered in the NMNH among specimens recognized as Boisduval types acquired via the William Barnes collection. The printed labels read "EX-MUSAEO/Dris. [Doctoris] BOISDUVAL" and "Oberthur Collection." The handwritten determination label reads "Protodice. B. Sp./Am: Sept:." A red-bordered label reads "Type/protodice/a/c Höfer." The determination label is similar in format to labels by Boisduval, but is not in Boisduval's hand. It may have been written by Louis M. A. Depuiset, who helped maintain Boisduval's insect collection (Clément 1857). The abbreviation "B. Sp." probably refers to "Boisduval [as treated in] Species Générale" [Boisduval 1836]. The locality, "Am: Sept:" refers to Amérique Septentrionale [northern (North) America]. Boisduval (1836) confirmed that his collection contained specimens of *P. protodice* around the time when B&L Plate 17 was prepared. The specimen in the NMNH may further support the theory that the published figures were derived, not from a drawing by John Abbot, but from specimens in Boisduval's collection. Rather than "probably Screven Co., Georgia" as proposed by Miller & Brown (1981), the type locality of *P. protodice* is hereby amended to New York. J. E. Le Conte lived in New York and conceivably collected the figured specimens, including the "type" in the

NMNH.

Boisduval type specimens. Remarks are necessary regarding the Boisduval type specimens of North American Lepidoptera. In 1876, three years prior to his death, Boisduval bequeathed his Lepidoptera collection to Charles M. Oberthür of Rennes, France (Oberthür 1880). In 1913, American lepidopterist William Barnes organized a project for the purpose of comparing North American Lepidoptera specimens against the types in European museums (Barnes & McDunnough 1914, Oberthür 1913, 1914). The actual work was conducted by Barnes' curator, James H. McDunnough, who visited Oberthür on 13-14 October 1913 to examine the Boisduval material. Because Boisduval had designated very few type specimens, McDunnough and Oberthür personally selected Boisduval specimens to serve as types (Oberthür 1913, 1914). Oberthür (1913, 1914, 1920) figured many of these specimens, chiefly those from California described in Boisduval (1852, 1869). This selection process was largely based on existing determination labels and resulted in some misidentified "types" (Brown 1965, see Discussion).

Upon Oberthür's death in 1924, his collection was sold for the benefit of his heirs. Appointed to organize the sale was Carl Höfer (Riley 1927), who may have been Oberthür's curator (Emmel et al. 1998). Nothing further is known of Höfer; even the exhaustive historical files of the library of the Deutsches Entomologisches Institut, Eberswalde, Germany, lack information about his identity (R. Gaedike, pers com.). With the exception of the Sphingidae and Hesperidae, William Barnes purchased the Boisduval "types" of North American Lepidoptera (Riley 1927, Horn et al. 1990). According to information on some of the specimen labels (Fig. 14), Barnes received this material in 1925. Oberthür's brother, René, purchased the specimens of Hesperidae. In late 1926 and early 1927, the bulk of the C. Oberthür collection, about 750,000 specimens, was secured by the British Museum (N. H.) (now The Natural History Museum, London) (Riley 1927, 1964). The specimens of Hesperidae, including North American types, were purchased in 1931 by the BMNH from R. Oberthür (Riley 1964).

In the Entomology Library of The Natural History Museum is a loose-leaf typewritten manuscript entitled "List of specimens disposed of by C. Höfer prior to purchase of remainder by the British Museum (Natural History)." It is stamped "C. HOFER, 36, FS DE PARIS, RENNES (FRANCE)," which was Oberthür's address. The list was conceivably prepared in 1927 by Norman D. Riley, who was then serving as

an Assistant Keeper of Entomology in the BMNH. Riley (1927) wrote a detailed account of the purchase of Oberthür's collection and noted that facts about preceding sales of Oberthür's specimens were given to the BMNH; the typewritten list of specimens likely served as a summary of these transactions. Unfortunately, entries on the list have faded and become difficult to read. One section has a handwritten heading of "Dr. Barnes" and inventories the specimens that were sent to W. Barnes in 1925. Apparently based on a similar list from Höfer, the specimens sent to Barnes were labeled upon receipt as "type a/c [according to] Höfer." Although Emmel et al. (1998) believed that Barnes personally penned these labels, they were actually prepared by Foster H. Benjamin, who curated Barnes' collection from 1922-1927. Benjamin signed and dated some of the labels on these specimens (Fig. 14). After Barnes' death in 1930, his collection was purchased the following year by the United States Government for \$50,000 and moved to the National Museum in Washington, D.C. (Hewes 1936, Horn et al. 1990).

Boisduval's specimens from California were obtained mostly from a single collector (P. J. M. Lorquin) and their history is reasonably well documented (Emmel et al. 1998), lending credibility to their acceptance as holotypes and syntypes. On the other hand, the "types" that correspond to taxa described in B&L cannot be traced to any particular source. Although Boisduval (1836) claimed that he possessed specimens of almost all the taxa that he described in B&L, he maintained his collection until 1876 and he may have acquired the selected "type" specimens up to 47 years after the original descriptions were published. In addition, not all these "types" are consistent with the written descriptions, suggesting Boisduval based his original characterizations on other specimens or John Abbot drawings. Brown (1965) and Miller & Brown (1981) considered such specimens to be "pseudotypes." Most of the written descriptions in B&L were accompanied by Abbot illustrations and it is safe to assume that the original drawings were at least consulted for all these treatments. The specimens selected as "types" for B&L taxa serve as helpful vouchers and can convey Boisduval's taxonomic concepts, but they cannot automatically be accepted as valid holotypes or syntypes. Some of these "types," especially of Hesperidae, may correspond to specimens from Boisduval's collection that were drawn by Blanchard for plates in B&L. If so, a careful comparison against the original drawings in South Carolina may establish such specimens as acceptable types.

Drawings by Blanchard and Abbot. Émile Blanchard's artwork is meticulous, arguably surpassing Abbot in detail and accuracy. It seems inconceivable, but he was only about 15 years old when his drawings in South Carolina were completed. Blanchard was extraordinarily gifted and his father was also a natural history illustrator. Like contemporary French entomologist Pierre Hippolyte Lucas, Blanchard began work in the Muséum National d'Histoire Naturelle in Paris at a young age. Lucas was just 13 years old when he was hired to apprentice in the zoology laboratory while Blanchard was 14 when he accepted a temporary position in the entomology laboratory (Gaudry 1900, Lesne 1901). Beginning in his teens, Blanchard published on many subjects, including insects, mammals and fish. He was probably introduced to Boisduval when he started working at the museum (ca. 1833) and this is consistent with Boisduval's use of Blanchard drawings for plates in various publications at that time, including Boisduval (1833, 1836) and Boisduval et al. (1832-1837). Duménil and Borromée were also the master engravers for these works, and Duménil served as the publisher for Blanchard (1840). The first plate issued in B&L from an illustration by Blanchard was Plate 35, copied from drawing no. 14 in South Carolina and published no earlier than 1833 (dos Passos 1962, Cowan 1969). Blanchard became one of the most celebrated French natural history illustrators of his era, but sadly his eyesight deteriorated over the course of his lifetime, resulting in total blindness in his later years (Gaudry 1900).

In contrast, Abbot was over 60 years old when Le Conte commissioned him for the drawings in South Carolina. Out of convenience, Abbot often relied on template drawings that he developed earlier in his career to produce duplicate renderings of insects, as well as birds (Simpson 1993, Gilbert 1998). Consequently, Abbot's drawings in South Carolina share numerous figures with his other original and published illustrations. I compared Abbot's 105 Lepidoptera drawings in South Carolina with his 95 Lepidoptera illustrations completed between 1816 and 1818 for English Naturalist William Swainson that are now deposited in the Alexander Turnbull Library, Wellington, New Zealand. Fully 142 figures of adults and early stages are duplicates. At least ten of the butterfly species treated in both B&L and Smith & Abbot (1797) share identical figures of early stages. Baker (1959) noted that plates in B&L resembled some of the original Abbot drawings in Emory University. In his exhaustive treatment of geometrid moths, Packard (1876) copied twenty-three figures of

adults and early stages from "Abbot MS [manuscripts]." Many of these figures are identical to those on drawings in South Carolina, but Packard doubtless copied them from other Abbot watercolors once owned by A. G. Oemler and Cambridge botanist Asa Gray. At that time, these drawings were deposited in the library of the Boston Society of Natural History where Packard served as acting librarian and custodian in 1865 (Mallis 1971). They were procured in 1946 by Harvard University.

Hillhouse (1985) aptly described Abbot's artwork as "true in color, subtle and full of light, exact in size, and with detailed accuracy." Nonetheless, a few of Abbot's illustrations in South Carolina lack much of the painstaking detail of his earlier watercolors. The engravers and colorists were often criticized for the imprecision of many plates in B&L, which may have resulted in Duménil's early departure from the project (Cowan 1969). It can now be seen that Abbot himself was also responsible for some of the inaccuracies.

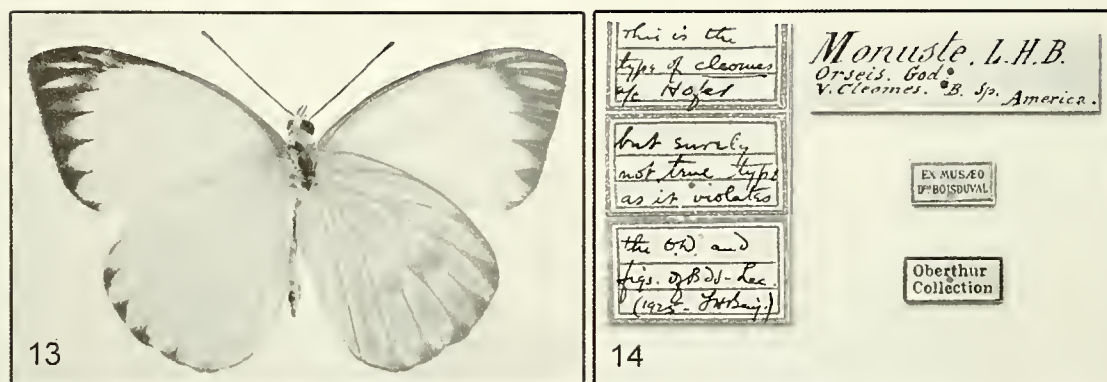
Besides *M. ismeria* (Plate 46), another problematic illustration in B&L was that of *Thecla liparops* Le Conte (= *Satyrium liparops*) (Plate 31, figs. 1-2). Edwards (1872) thought the published figures of *T. liparops* were "a wretched attempt" at copying the work of Abbot, adding, "the species has puzzled lepidopterists, nothing like that plate having been seen in nature." Michener & dos Passos (1942) similarly remarked that the ventral figure on the published plate "does not agree with any butterfly known to the authors." Forbes (1943) assumed that details of Abbot's original drawing had been "tampered with" on the plate. Gatrell (2001) also thought the published figures of *T. liparops* were surely inferior to Abbot's original drawing. Drawing 12 in South Carolina demonstrates that Abbot's figures were poorly executed and the published plate was a faithful reproduction (Figs. 3, 6, 7). Although the colorists were sometimes a bit too liberal with their use of blue on the plate, the overall design is the same. Abbot's drawing for *T. liparops* confounded even Boisduval, who argued that it had "la plus grande ressemblance avec la Favonius de Smith" [the most greatest resemblance with the Favonius of Smith]. Boisduval so disagreed with Le Conte over the identity of the depicted species that he ceded authorship of the name to Le Conte. The identity of this taxon remained in some doubt for over a century.

Original moth drawings. Moth drawings in South Carolina were almost certainly destined for use in preparing the plates for another installment of *Histoire Générale*. Boisduval planned to continue the project with a volume on moths, but it was never realized

(Cowan 1969). French entomologist Achille Guenée consulted a set of Abbot drawings for descriptions and plates in his multivolume treatise on moths (Guenée 1852-1858), but the whereabouts of these drawings was unknown (Gall & Hawks 2002). In the preface to his first volume on noctuid moths, Guenée referred to a set of Abbot drawings provided to him by Boisduval. Guenée described them as being accompanied by the figures of the caterpillar and he erroneously related that the renderings were intended for the continuation of Smith & Abbot (1797). Oberthür (1920), who was personally acquainted with both entomologists, revealed that Boisduval had loaned Guenée the Abbot drawings now in South Carolina (and probably also the missing hostplant drawings). Upon a recent examination of these drawings, Lawrence F. Gall confirmed that they were likely among those consulted by Guenée. A more thorough examination of Guenée (1852-1858) is required to determine if any published figures were copied from these Abbot drawings. Émile Blanchard also provided some of the original drawings for Guenée's published plates. Sixteen smaller moth drawings in South Carolina (nos. 58, 66, 67, 70, 82, 84, 85, 87, 88, 90, 92, 103, 104, 107, 114, 115) are erude relative to Abbot's work and were rendered on darker paper. J. E. Le Conte, a less talented illustrator, may have been the artist as suggested by a reference to "Leconte" on drawing 90.

The true identity of *Pieris cleomes*. This taxon was described in B&L on pages 43-45 and figured on Plate 16 from a drawing by John Abbot. The written description characterized the male and included brief remarks about the female and early stages. The plate included dorsal and ventral males, dorsal female, larva on a host leaf, and pupa (Fig. 8). The text stated, "il habite la Géorgie et la Virginie, mais il y est assez rare; il est plus commun dans la Floride" [it lives in Georgia

and Virginia, but it is rather rare there; it is more common in Florida]. The dorsal adults in the plate have more distinct black wing borders than generally found in the Florida subspecies *Ascia monuste phileta* (Fabricius). Subsequent interpretations of *cleomes* varied. The first was Boisduval himself who wasted no time in treating *cleomes* as a variety of *Ascia monuste* (L.) (Boisduval 1836). Despite Boisduval's revised treatment, Doubleday (1844) listed three specimens from Honduras in the British Museum as *P. cleomes*. Röber (1909) called *cleomes* a form of *A. monuste* from "the south of North America" and characterized it as "somewhat smaller and less blackly marked." Talbot (1932) listed it as a subspecies of *A. monuste* from the southern United States. Comstock (1943) proposed that *cleomes* "might be properly applied to a subspecies with a more northern range than *phileta*." Chermoeck (1946) also treated *cleomes* as a subspecies of *A. monuste* and suggested that it must have been a small population that eventually became extinct. Klots (1951) observed that *cleomes* "resembled *m. monuste* rather than *phileta*," and likewise believed it was "possibly a now extinct or diluted subspecies of the coastal plain from Georgia onwards." dos Passos (1964) synonymized *cleomes* under nominate *A. monuste*. Harris (1972) distinguished *cleomes* as having a "slightly wider and continuous black border on the forewings" and thought that Abbot may have figured a heavily marked individual of *A. m. phileta*. Howe (1975) referred to "unresolved problems related to *cleomes*" and treated it as a possibly extinct subspecies that did not possess a dark form of the female as in *A. m. phileta*. Miller & Brown (1981) and Ferris (1989) listed *cleomes* as a subspecies of *A. monuste*, but Ferris thought it might apply to a "pale migratory form of *A. m. phileta*." Most recently, Gatrell (2000) also considered this butterfly to



FIGS. 13-14. Unacceptable "type" specimen of *Pieris cleomes*. 13, Dorsal (left) and ventral of male *A. m. orseis* from Boisduval's collection. 14, Specimen labels.

represent the “never before collected” subspecies *A. m. cleomes*.

Abbot's drawing 7 of *A. monuste* in South Carolina includes a penciled reference to Plate 16 of B&L (Fig. 10). Boisduval wrote the name “*Pieris orseis* God.” on the drawing, obviously in his attempt to compare the figures with what is now recognized as *Ascia monuste orseis* (Godart). He also discussed *orseis* in the texts of B&L and Boisduval (1836). Sets of Abbot drawings in The Alexander Turnbull Library (Wellington, New Zealand), The Houghton Library (Harvard University), and The Natural History Museum, London, contain exact duplicates of a larger rendering of *A. monuste* that portrays the same adults and early stages as those in drawing 7 in South Carolina and B&L Plate 16 (Figs. 8-10). However, the larger drawings also portray a dark female (Fig. 9). This dark form is characteristic of *A. m. phileta* and contradicts the notion of Howe (1975) that *cleomes* lacks dark females. The published plate also included a plant leaf that matches a portion of the hostplant in the larger drawings (Figs. 8, 9). A comparison of Abbot's notes demonstrates that Boisduval possessed yet another duplicate of Abbot's larger rendering of *A. monuste* (Table 2). Abbot's notes for each drawing are as follows:

1. For John Francillon, ca. 1805-1810 (The Natural History Museum, London; see Gilbert 1998, Pl. 29): “The White Butterfly. *Papilio Danaei eandidi*. The caterpillar feeds on the plant figured. It tied itself up 16th July and changed in the chrysalis 17th and bred 23rd. near half the female Butterflies varies being a dingy black as figured. They continue in plenty about Savannah all this last summer but I have rarely seen any for the last twelve years. I am indebted for this discovery of the caterpillars to my friend Mr. Oemler who first found it in his garden in Savannah.” [although this volume of drawings is dated 1804, Abbot did not meet Oemler until 1805].
2. For Augustus G. Oemler, ea. 1810 (Houghton Library, Harvard University; see Rogers-Price 1983, catalog fig. 10): “*Pap. Danaei Cleome*. Feeds on the *Cleome Pentaphilles*. Tied up 16th July. Changed 17th bred 23rd nearly half of the female Butterflies varies being a dingy black as figured, Some years they are in plenty about Savannah, but in others very rare if to be met with at all. I am indebted for the discovery of this Caterpillar to my friend Mr. Oemler who first met with it in his garden in Savannah.”
3. For J. E. Le Conte, ca. 1815-1820 (given to Boisduval) (Houghton Library, Harvard University; notes only): “White Butterfly. *Danaei Cleome*. Feeds on the *Cleome pentaphilles*. Changed 17th July, bred 23rd July. nearly half of the female Butterflies varies being of a Dingy colour, as figured. They are generally rare, but some years at intervals are very plenty in the lower parts of the Country, I am indebted for the discovery of the

caterpillar of the Species to my friend Mr. Oemler, who first found it in his garden in Savannah.”

4. For William Swainson, ea. 1817 (Alexander Turnbull Library, Wellington, New Zealand; Fig. 9): “*Papilio Danaei Cleome*. Feeds on the *Cleome Pentaphilles*. Tied up 16th July, changed 17th, bred 23rd. many of the female Butterflies varies being of a dingy black as figured. This Butterfly is some Summers very plenty in Savannah but is rare in the Inland parts.”

The Latin names that Abbot used for this species were based on the Linnaean classification system, where *Papilio* was the genus, *Danaei* (or *Danaei*) was a group that included the *Pieridae*, *Candidi* was a subdivision of white butterflies, and *Cleome* was the name coined by Abbot based on the hostplant. The text for *P. cleomes* in B&L stated, “*Cette chenille vit dans les jardins, sur le cleome pentaphylla*” [this caterpillar lives in the gardens, on the *cleome pentaphylla*] and was obviously excerpted from Abbot's notes for the hostplant drawing that Boisduval possessed (3 above; Table 2). Abbot correctly identified the hostplant in his drawings as *Cleome gynandra* L. (= *C. pentaphylla*) (Capparaceae). Le Conte wrote “*Cleome*” on drawing 7 in South Carolina, undoubtedly in reference to the name or hostplant given in Abbot's notes. The adult figures of *P. cleomes* in B&L were evidently copied from drawing 7 (Fig. 10), while the host leaf was taken from the missing hostplant drawing that was analogous to surviving copies (Fig. 9).

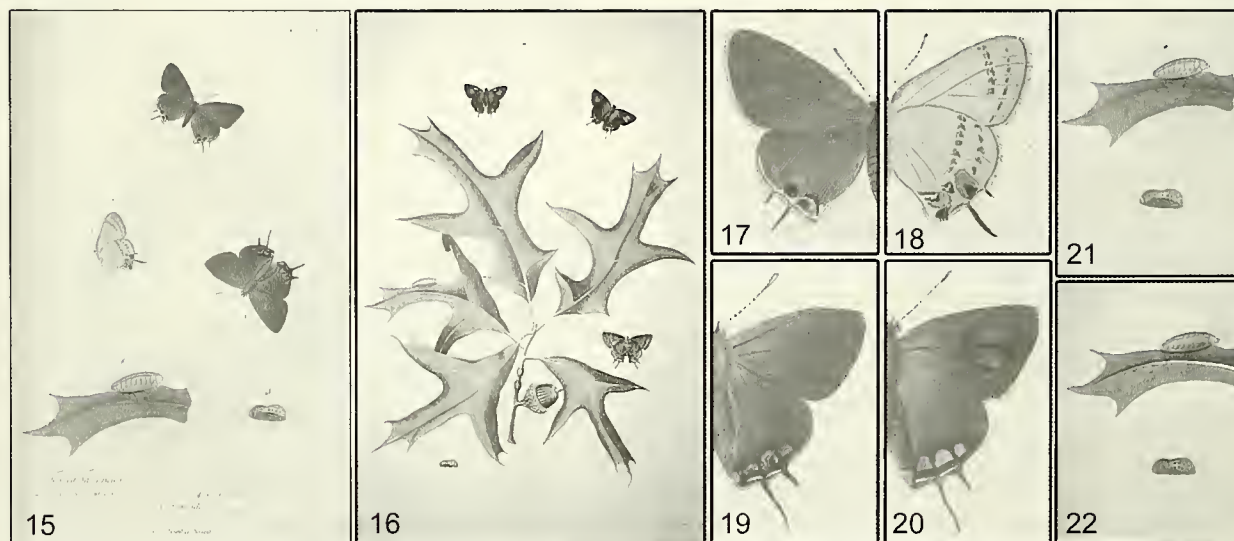
Abbot's observations mirror the modern occurrence of *A. m. phileta* in coastal Georgia, which Harris (1972) defined as “fairly common at times, especially near or on the coastal islands, it is very sporadic in occurrence. Further inland it becomes infrequent to very rare.” The text of B&L even referred to the more common occurrence of the butterfly in Florida where *A. m. phileta* is most abundant. This subspecies is migratory and adults sometimes reach more northern coastal areas in great numbers, such as in June 1881 when thousands were recorded in Bluffton, South Carolina (Williams 1930). Bluffton, Beaufort County, South Carolina is located 40 km (25 mi) north of Savannah, Georgia where Abbot observed *A. monuste*. Adults of *A. m. phileta* are extremely variable and individuals from peninsular Florida routinely present the same dorsal and ventral characteristics as the figures in Abbot's drawings. Abbot's illustrations and observations, as well as the comments in B&L, are referable to *A. m. phileta*. *Pieris cleomes* is therefore synonymous with *A. m. phileta* and the engraver, P. Duménil, simply exaggerated some of the pattern elements (Figs. 11, 12). This finding is more plausible than the fanciful theory that *P. cleomes* represented an

extinct subspecies. Miller & Brown (1981) gave the type locality of *P. cleomes* as "probably Screven Co., Georgia." In view of Abbot's notes, I hereby amend the type locality to Savannah, Chatham County, Georgia. As the identity of the intended butterfly is now apparent, and *P. cleomes* is not involved in any complex zoological problem, there is no exceptional need to designate a neotype to objectively define the taxon.

Finally, it must be mentioned that there is a male *A. monuste* from Boisduval's collection in the NMNH that was sent to W. Barnes as the type of *P. eleomes* (Fig. 13). It was listed as "*Pieris monuste eleomes* Bdv. & Lec." on the typewritten list of specimens that were purchased from the Oberthür collection by W. Barnes (list in The Natural History Museum, London). The original determination label, not written by Boisduval (Depuiset?), reads "*Monuste* L. H. B./*Orseis*. God./v. *Cleomes*. B. Sp./America" (Fig. 14). The three letters "L. H. B." probably refer to the name *monuste* as published by Linnaeus, Hübner, and Boisduval. "*Orseis*" and "*Cleomes*" were written in smaller handwriting directly below "*Monuste*," obviously as synonyms following the treatment in Boisduval (1836). The line "v. *Cleomes*. B. Sp." likely means "variété *Cleomes* [as treated by] Boisduval [in] *Species Générale*." Also present are three conjoined red-bordered labels, written by F. H. Benjamin, that read, "This is the type of *eleomes* a/c Hofer, but surely not true type as it violates the O.D. and figs. of Bdl.-Lec. (1925-J. H. Benj.);" (Fig. 14). As indicated by

Benjamin, this specimen is contrary to the original description of *P. cleomes*. In the text of B&L, Boisduval compared *P. eleomes* to *monuste* and *orseis*, noting that the ventral hindwings of *cleomes* are less brown, the dorsal forewings lack elliptical white spots at the apex, and the dorsal hindwings of the male lack a series of black marginal spots. The "type" specimen in the NMNH (Fig. 13) boldly exhibits all these features and is consistent with the South American subspecies *A. m. orseis*. Again, this demonstrates that such Boisduval "type" specimens for B&L taxa were arbitrarily selected on the basis of existing determination labels that included applicable names.

The true identity of *Thecla favonius* in Boisduval & Le Conte (1829-[1837]). Plate 30 in B&L was identified as *Thecla favonius* from the "les parties méridionales des Etats-Unis" [the southern parts of the United States]. P. Duménil was credited as the artist, but in the text Boisduval attributed the figures to Abbot. The plate depicted dorsal and ventral males, dorsal female, larva on a host leaf, and pupa (Fig. 15). In an "Observation" following the treatment of *T. favonius* in B&L, Boisduval wrote that he doubted his *favonius* was the same species described and illustrated as *Papilio favonius* in Smith & Abbot (1797) (= *Satyrium favonius*) (Fig. 16). He suspected that his *favonius* was synonymous with *Papilio melinus* Hübner (= *Strymon melinus*), whereas the butterfly described in B&L as *Thecla liparops* was akin to the *favonius* of Smith & Abbot (1797). To further complicate matters, Boisduval also figured S.



FIGS. 15-22. *Thecla favonius*, Plate 30 in Boisduval & Le Conte (1829-[1837]) (B&L) and *Papilio favonius*, Plate 14 in Smith & Abbot (1797) (S&A). 15, *T. favonius*, B&L. 16, *P. favonius*, S&A. 17, Dorsal male *S. melinus*, B&L. 18, Ventral male *S. melinus*, B&L. 19, Dorsal female, B&L. 20, Dorsal female, S&A. 21, Larva and pupa, B&L. 22, Larva and pupa, S&A.

melinus on Plate 28 and described it as *Thecla hyperici* Boisduval & Le Conte. The association of these various figures and names created nomenclatural chaos that persisted for decades. Morris (1862) complained, "There is an almost inextricable confusion in the determination of these species." Sixty years later, Oberthür (1920) bemoaned that Boisduval's treatment resulted in "un manque fâcheux de clarté" [an annoying lack of clarity]. Harris (1841) was the first to associate the *favonius* of B&L with *S. melinus* when he noted that it was the same as the species he described as *Thecla humuli*, now considered a subspecies of *S. melinus*. In his copy of B&L, Cyril F. dos Passos wrote on Plate 30, "= *melinus* Hbn." However, this synonymy is only partially correct.

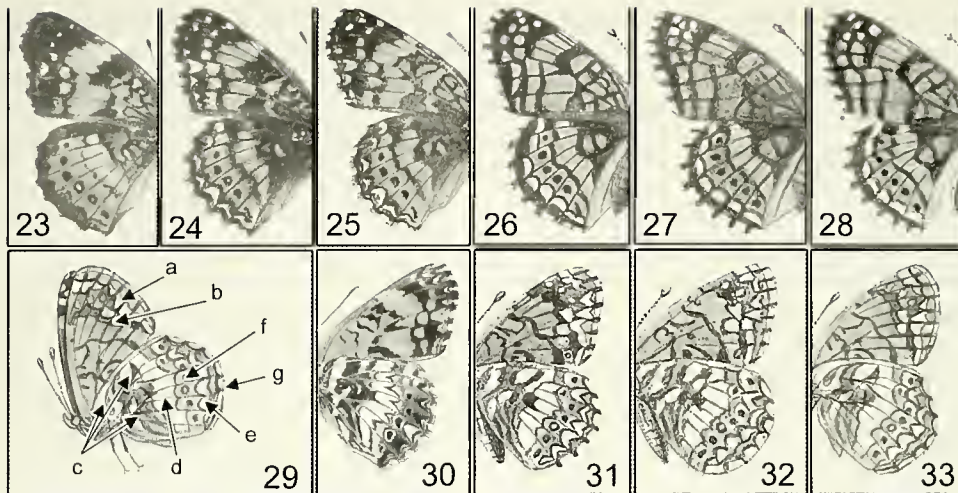
Oberthür (1920) accurately determined that the dorsal male in B&L Plate 30 was *S. melinus* (Figs. 17, 18), but observed that the female was a different, unidentified species. A comparison of this female figure with other illustrations by Abbot reveals that it is equivalent to the female of *S. favonius* on Plate 14 of Smith & Abbot (1797), but was inexplicably colored to portray a darker butterfly (Figs. 19, 20). The larva, pupa, and host leaf also correspond to the plate of *S. favonius* in Smith & Abbot (1797) (Figs. 21, 22). Therefore, the *favonius* of B&L is synonymous with both *S. melinus* and *S. favonius*. Abbot (in Smith & Abbot 1797) called the figured hostplant "fork leaved black jack." Although J. E. Smith (in Smith & Abbot 1797) identified it as *Quercus rubra* L. (Fagaceae), it most closely resembles *Quercus laevis* Walter (Fagaceae), for which "black jack" is a colloquial name in the region where Abbot resided (M. A. Garland, R. P. Wunderlin pers. com.). Nineteenth century Florida botanist Alvan W. Chapman suspected that Abbot's references to "black jack" represented *Quercus catesbaei* Michx. (Fagaceae) (Scudder 1888-1889), now considered a synonym of *Q. laevis*. Abbot's original drawings for Smith & Abbot (1797) are currently deposited in the John Work Garrett Library of the Johns Hopkins University. The Linnean Society of London preserves his accompanying notes.

The story of B&L Plate 30 does not end there. Boisduval remarked in B&L that the larva in the Abbot drawing used for Plate 30 was the same as the one figured in Smith & Abbot (1797), but the adults were consistent with *T. hyperici* (= *S. melinus*). This infers that Abbot mistakenly inserted adult figures of *S. melinus* into one of his hostplant drawing of *S. favonius*. This assertion seems unlikely, especially if we are also to believe that Abbot altered the coloration of his female *S. favonius* to more closely resemble *S. melinus*. Furthermore, the figures of *S. melinus* in

Plate 30 are dissimilar to Abbot's other representations of this species. There are also no entries in Abbot's notes at Harvard that correspond to a third drawing of *S. melinus*. As credited on Plate 30, Duménil was probably responsible for these figures and he based them on a specimen in Boisduval's collection. Abbot's notes at Harvard also lack an appropriate entry for a drawing of *S. favonius*, suggesting Duménil copied the female and early stages from Plate 14 of Smith & Abbot (1797). Perhaps Boisduval desired to reconcile *favonius* and instructed Duménil to include both interpretations of this taxon. Plate 30 is unquestionably the most peculiar plate in B&L.

The true identity of *Melitaea ismeria*.

According to Cowan (1969), the most accurate publication date for *M. ismeria* in B&L is 1835, not 1833 as reiterated by other authors. This includes Calhoun (2003), in which I provided evidence that *M. ismeria* is synonymous with *C. gorgone*, rather than *C. nycteis* as proposed by Gatrell (1998). The original description of *M. ismeria* in B&L is an accurate portrayal of the figures in Abbot's drawing 24 in South Carolina. Based on a faulty translation of the description of the ventral wings, Gatrell (2003) argued that the written account was likely derived from a specimen of *C. nycteis*. Following is the description of the ventral wings as it appeared on pages 168-169 of B&L with a translation that corresponds to Abbot's original drawing (Fig. 29) (see Calhoun (2003) for a color reproduction): "Le dessous des supérieures diffère du dessus en ce que, avant le bord postérieur, il y une bande blanche maculaire, précédée de trois ou quatre taches de sa couleur. Le dessous des ailes inférieures est fauve, avec des taches blanches vers la base, puis une bande médiane irrégulière, transverse, et enfin des lunules marginales de la même couleur; celles-ci sont séparées de la bande transverse par une série de points noirâtres correspondant à ceux du dessus. La frange de toutes les ailes est noirâtre entrecoupée de blanc" [The underside of the forewing differs from the upperside in that, before the posterior edge, is a white macular band (a), preceded by three or four spots of its color (b). The underside of the hindwing is fawn, with white spots towards the base (c), then an irregular median band, transverse (d), and lastly marginal lunules of the same color (e); these are separated from the transverse band (d) by a series of blackish points (f) corresponding to those of the upperside. The fringe of all the wings is blackish intersected by white (g)]. Gatrell (2003) misapplied the fawn ("tawny") color to the median band and lunules of the hindwing. In so doing, he confused these characters with other pattern



FIGS. 23-33. *Chlosyne* specimens and Abbot figures. **23**, Dorsal *C. nycteis* female, 16.vi.1996, Jackson Co., Florida (leg. J. V. Calhoun) [= *C. ismeria ismeria* of Gatrell (1998)]. **24**, Dorsal *C. gorgone* female, 28.iv.2003, Hancock, Burke Co., Georgia (leg. J. V. Calhoun) [= *C. g. gorgone* of Gatrell (1998)]. **25**, Dorsal *C. g. carlota*, 7.v.1972, Jasper Co., Georgia (FSCA). **26**, Abbot's dorsal female, ° London. **27**, Abbot's dorsal female, New Zealand (ref. no. E-272-f-017). **28**, Abbot's dorsal female, South Carolina°. **29**, Abbot's original ventral figure for *M. ismeria* (characters correspond to text). **30**, Ventral *C. gorgone*. 28.iv.1995, Orangeburg Co., South Carolina (ex. ovum, FSCA) [= *C. g. gorgone* of Gatrell (1998)]. **31**, Abbot's ventral figure°, London. **32**, Abbot's ventral figure, New Zealand. **33**, Abbot's ventral figure, South Carolina°. (°© The Natural History Museum, London; °°Thomas Cooper Library, University of South Carolina)

elements. Furthermore, the original description clearly defined the lunules as being separated from the median band by blackish points, not "punctuated" by points as indicated by Gatrell's translation.

Drawing 24 in South Carolina is one of at least four drawings by John Abbot that depict analogous figures of *C. gorgone*, though his attention to detail varied. Abbot referred to Burke County, Georgia in his notes for three of these drawings. Gatrell (1998) characterized populations of *C. gorgone* currently found in extreme eastern Burke County and adjacent portions of South Carolina as a univoltine (April-early May) subspecies, *C. g. gorgone*. The dorsal surface of a female *C. gorgone* that I collected in April 2003 in eastern Burke County is reminiscent of Abbot's female figures (Figs. 24, 26-28), which are unlike *C. nycteis* from the region (Fig. 23). The ventral surfaces of some individuals of the single-brooded phenotype of *C. gorgone* are also consistent with Abbot's ventral figures (Figs. 30-33). However, Abbot's drawings more closely resemble specimens tentatively recognized as the widespread subspecies *C. g. carlota* (Reakirt) (Fig. 25). The ventral surface of a pre-1840 Georgia specimen of *C. gorgone* in The Natural History Museum, probably collected by Abbot and identified by Gatrell (2003) as *C. g. carlota*, is extremely similar to Abbot's ventral illustrations (Callhoun 2003, figs. 23, 24). Populations attributed to *C. g. carlota* tend to be slightly paler and are multivoltine in Georgia, with adults flying from April to September (Harris 1972). A record from Houston

County, located within the same physiographic section of Georgia as Burke County, is dated 3 June (Harris 1972). This is compatible with the adult emergence date of 26 May given in Abbot's notes (though Abbot's rearing conditions could have altered development). This can also account for the blooming *Helianthus divaricatus* (L.) (Asteraceae) hostplant in three of Abbot's duplicate drawings; this plant flowers after the flight period of the single-brooded populations of *C. gorgone*. It is notable that the dorsal painting of a male *C. g. carlota* by Howe (1975, Pl. 40, fig. 1) is remarkably consistent with the male figure by Abbot (Callhoun 2003, figs. 3, 22). The proximity of occurrence and relationship of the perceived *C. gorgone* phenotypes in Georgia are unknown. Abbot traveled over large portions of southeastern Georgia in search of specimens and his reference to Burke County does not exclude the possibility that he encountered *C. gorgone* in other areas. Gatrell (2003) believed that the adult butterflies in Abbot's drawings are unlike any taxon in the eastern United States and proposed that they represent "composites" of *C. gorgone* and *C. nycteis*. I see no evidence of this.

The right half of Abbot's dorsal figure of *C. gorgone* in South Carolina is more refined, thus it was used to create the dorsal engraving of *M. ismeria* in B&L (Callhoun 2003, figs. 8,9). However, the left half (Fig. 28) is more faithful to Abbot's other versions of the same figure. A close examination of the adult figures in this drawing revealed no subsequent alterations to wing shape or design. Abbot simply rendered these

figures with less devotion to his template, contributing to 170 years of confusion.

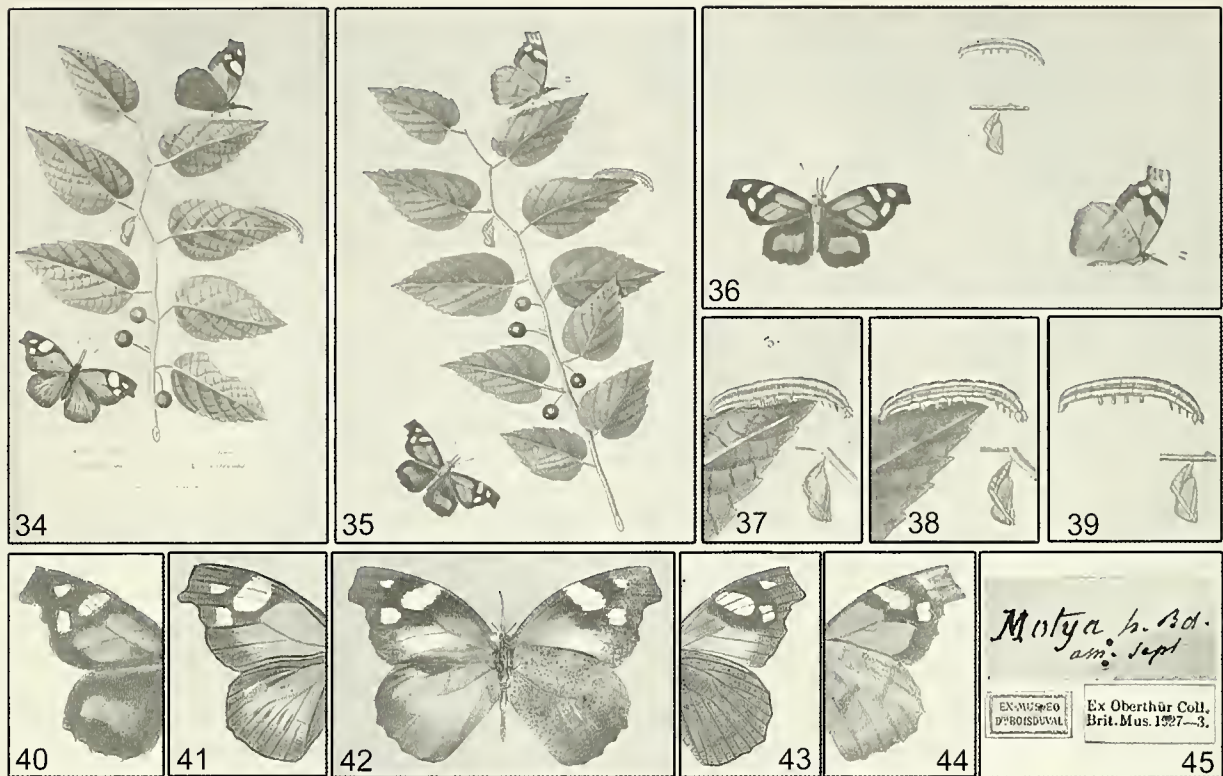
Doubleday (1847) named *Melitaea nycteis* in connection with an accurate engraving of the female holotype (in The Natural History Museum, London), but failed to provide a written description. He did not consider *M. nycteis* to be the same as *M. ismeria*, which he associated with the species now recognized as *C. gorgone* (Calhoun 2003). Boisduval's own concept of *C. nycteis* apparently also differed from that of *M. ismeria*. Boisduval (1869) listed *Melitaea nycteis* and characterized it as approaching the appearance of *M. ismeria*, but he did not suggest they were conspecific. Boisduval published this treatment 34 years after he described *M. ismeria*, and 22 years after Doubleday had named *M. nycteis*. Although Boisduval (1869) referred to *nycteis* from California where it is not known to occur, he was likely familiar with this widespread North American species by that time. There was little potential for misidentification, as Boisduval (1852, 1869) considered the most similar California species to represent different taxa (see Emmel et al. 1998). Boisduval was presumably confused about the source of some of his specimens, as he also listed several other species not validly recorded from California (J. F. Emmel pers. com.). The specimens listed by Boisduval as *C. nycteis* have not yet been located. If correctly identified, they were likely from the eastern United States where the majority of Boisduval's American specimens originated. During the preparation of Doubleday et al. (1846-1852), in which *M. nycteis* was first named and figured, Boisduval provided the authors access to his personal collection and even loaned them specimens for reproduction on their color plates (Oberthür 1880). Like many entomologists of his day, Doubleday took specimens to Boisduval for evaluation. Doubleday mentioned one such trip in 1841 when he wrote, "should I go merely for a short visit to France I mean to take a host of things for Boisduval's inspection" (Scudder 1869). Doubleday freely loaned and gave away specimens to other researchers, sometimes to the detriment of the collections in his care (Salmon 2000). There was ample opportunity for Doubleday to discuss the identity of *M. ismeria* and *M. nycteis* and compare specimens with Boisduval.

Additional new evidence indicates that Boisduval ultimately possessed at least one specimen that he identified as *ismeria*. The typewritten list in The Natural History Museum, itemizing the Boisduval "types" that were sent to W. Barnes in 1925, has a ticked entry for "*Phyciodes ismeria*." The use of the

genus *Phyciodes* reflects prevailing usage at the time the list was created (ca. 1927), as Boisduval's determination labels typically included only the species name. The specimen has not been found in the NMNH and its fate remains a mystery, yet there are two valuable clues to its identity. J. H. McDunnough, who ostensibly selected this specimen in 1913 to serve as the type of *M. ismeria*, and F. H. Benjamin, who would have accessioned this "type" into the Barnes collection in 1925, both subsequently coauthored checklists of Lepidoptera with Barnes in which they considered *ismeria* to be synonymous with *gorgone* (Barnes & McDunnough 1917, Barnes & Benjamin 1926). Prior to moving the massive Barnes collection from Decatur, Illinois to Washington, D. C., workers spent two weeks "ramming home" the 300,000 insect pins to prevent the attached specimens from jarring loose in transit (Hewes 1936). The missing "type" of *M. ismeria* was perhaps a casualty of this process.

The true identity of *Libythea motya* in Boisduval & Le Conte (1829-[1837]). Abbot is also credited with rendering the original drawing for Plate 64 in B&L of *Libythea motya* (Fig. 34). Many authors, such as Morris (1862), Seitz (1916), Riley (1975), Miller & Brown (1981), and Smith et al. (1994) incorrectly attributed the original description of *motya* to this plate in B&L, but Hübner (1819-[1827]) was actually the first to figure this Cuban species, as *Hecaërge motya* (Plate [137], figs. 1-2). No textual reference accompanied the plate of *Libythea motya* in B&L. Because of the perceived connection of the original drawing to Abbot, the figured specimens were thought to have come from Georgia. Harris (1972) speculated that Abbot may have captured a rare Cuban stray or acquired it from a source outside Georgia. Miller & Brown (1981) observed that the illustration seems to depict the Cuban butterfly, but suspected it actually represented a "genetic throwback" of the eastern North American subspecies, *Libytheana carinenta bachmanii* (Kirtland).

The plate of *Libythea motya* in B&L was obviously based on an Abbot hostplant drawing of *L. c. bachmanii* that was a duplicate of another Abbot illustration now in New Zealand (Fig. 35). Abbot's manuscript notes for the drawing in New Zealand are identical to his notes at Harvard University that likely accompanied the drawing used for the published plate (Table 2). Boisduval gave Scudder the notes now at Harvard and Scudder's handwritten name "*bachmanii*" is found next to Abbot's entry for this species. For his treatment of *bachmanii*, Scudder (1888-1889) obtained the information "Georgia 'rare' (Abbot)"



FIGS. 34-45. *Libytheana c. bachmanii* and *L. motya*. 34, B&L Plate 64 identified as *Libythea motya*. 35, John Abbot's drawing of *L. c. bachmanii*, New Zealand (ref. no. E-272-f-018). 36, Drawing 38° of *L. c. bachmanii*. 37, Larva and pupa, B&L Plate 64. 38, Larva and pupa from Abbot's drawing, New Zealand. 39, Larva and pupa from Abbot's drawing 38°. 40, Dorsal figure of *L. c. bachmanii*, New Zealand. 41, Dorsal figure of *L. motya*, B&L Plate 64. 42, Dorsal (left) and ventral of male *L. motya* specimen from Boisduval's collection. 43, Ventral figure of *L. motya*, B&L Plate 64 (image reversed). 44, Ventral figure of *L. c. bachmanii*, New Zealand (image reversed). 45, Three labels from Boisduval's specimen of *L. motya*. (° Thomas Cooper Library, University of South Carolina)

from these notes. Drawing 38 in South Carolina also portrays identical figures of *L. c. bachmanii*, but without the sprig of the hostplant, *Celtis tenuifolia* Nutt. (Celtidaceae) (Fig. 36). The early stages and hostplant on B&L Plate 64 are identical to Abbot's drawings of *L. c. bachmanii* (Figs. 37-39), but the adult figures are quite different (Figs. 40, 41, 43, 44). The wings are broader and the palpi are more elongated. The forewing apical spots are inconsistent with his other drawings and the hindwings are rounded, not squared and deeply scalloped as in *L. c. bachmanii*. The dark brown coloring on the dorsal hindwings is much less extensive and the ground color of the ventral hindwings is dark, speckled with black spots. These deviations from Abbot's figures are too great to simply dismiss as a poor engraving.

An overlooked discovery by S. H. Scudder provides extraordinary insight into this mystery. Scudder (1888-1889) wrote, "I have examined in Boisduval's collection the butterfly figured in Boisduval and Le Conte's work on North American butterflies, under the name of *Libythea motya*, and it is the West Indian

species, *Hypataus terena* (Godart) the occurrence of which in the United States is unknown; the caterpillar and chrysalis, however, are from Abbot's drawings, and represent our common species [*L. c. bachmanii*]." Scudder most likely saw this specimen during his trip to Paris when he also examined the Abbot drawings now in South Carolina and obtained Abbot's notes at Harvard. Although he identified the specimen as the Hispaniolan species *Libytheana terena*, Scudder (1875) also called the published figures "a Cuban species," thus he considered *L. motya* to be synonymous with *L. terena*. Contemporaries of Scudder, such as Gundlach (1881), also placed *L. motya* within the synonymy of *L. terena*. The relationship of these taxa is still uncertain, but minor genitalic differences and a lack of intermediates suggest they are separate species (Kawahara 2001, Kawahara pers com.). Scudder must have used drawing 38 in South Carolina (Fig. 36) to confirm that the larva and pupa in B&L Plate 64 (Fig. 34) were from Abbot. Drawing 38 is listed in Scudder's personal notes (Harvard University) and he also

published a copy of the figured pupa (Scudder 1888-1889) (Table 1). Probably following Scudder's observations, Kirby (1896) also noted that only the early stages of B&L Plate 64 (figs. 3, 4) represented *L. c. bachmanii*.

To confirm Scudder's claim, the National Museum of Natural History (USNM, Washington, D. C.) and The Natural History Museum, London, were searched for specimens of *L. motya* and *L. terena* from Boisduval's collection. Nothing was found in the NMNH, but a single male *L. motya* was discovered in drawer no. 5445 of the Oberthür collection in London (Fig. 42). It has two printed labels that read, "EX-MUSAEO/Dris. BOISDUVAL" and "Ex Oberthür coll./Brit. Mus. 1927—3." It also has two handwritten labels that read, "Motya h. Bd./am. Sept." and "Hecaërge Motya./Hübner, (Samml. exot./schmett. II Vol. pl.34./fig.3,4) = ne ressemble pas / beaucoup a la fig. de Hübner./est intermediaire entre la / fig. 1 & la fig. 3" [(Sammlung exotischer schmetterling Vol. II, Plate 34, figs. 3, 4) = does not much resemble the figure of Hübner, is intermediate between the fig. 1 and the fig. 3]. The determination label (Fig. 45) was written by Boisduval and is consistent with his other known labels (Horn et al. 1990). The abbreviations "h." and "Bd." probably refer to the name *motya* as published by Hübner and Boisduval. Again, his abbreviation "am. Sept." refers to Amérique Septentrionale (northern [North] America). The other handwritten label is from C. M. Oberthür (Horn et al. 1990) and refers to the figures of Hübner (1819-[1827]), who illustrated two species under the name of *Hecaërge motya*: *L. motya* (figs 1-2, as the male) and *L. terena* (figs. 3-4, as the female). This is probably the same specimen that Scudder identified as the model for B&L Plate 64 (Figs. 41-43). Boisduval evidently ordered the reproduction of all the elements of Abbot's hostplant drawing of *L. c. bachmanii*, but substituted the adults with figures taken from his own specimen. *Libythea motya* of B&L is therefore synonymous with both *Libytheana motya* (adults) and *L. c. bachmanii* (early stages). Scudder (1888-1889) noted that, "*bachmanii* was also in Boisduval's collection, separated from the other [*motya*], but without name." *Libythea bachmanii* was not described until 1851 and previous authors considered all American specimens to represent *L. motya* (following B&L, not Hübner). Boisduval obviously chose to illustrate the butterfly that most closely resembled the male figures in Hübner (1819-[1827]). There is no surviving original drawing of Boisduval's *L. motya*, suggesting Borromée engraved the figures directly from this specimen. This additional evidence disassociates John Abbot from

these figures of *Libythea motya* and offers yet another glimpse into the complicated production of the legendary iconography by Boisduval and Le Conte.

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LITERATURE CITED

- BAKER, W. B. 1959. John Abbot's insects of Georgia. Emory Univ. Qrtly. 15: 146-152.
- BARNES, W. & F. H. BENJAMIN. 1926. Checklist of the diurnal Lepidoptera of boreal America. Bull. S. Cal. Acad. Sci. 25:3-27.
- BARNES, W. & J. H. McDUNNOUGH. 1914. Synonymic notes on North American Lepidoptera. Contr. Nat. His. Lepid. 2:197-223.
- . 1917. Check list of the Lepidoptera of boreal America. Herald Pr., Decatur, Illinois. 392 pp.
- BELL, E. L. 1938. A catalogue of the original descriptions of the Rhopalocera found north of the Mexican border. Part one.

- The Hesperioidea. Bull. Cheyenne Mountain Mus. 1 (part 1):1-36.
- BLANCHARD, É. 1840. Histoire naturelle des animaux articulés, annélidés, crustacés, arachnids, myriapodes et insectes. Vol. 3. Histoire naturelle des insectes; Orthoptères, Néuroptères, Hémiptères, Hyménoptères, Lépidoptères et Diptères. P. Duménil, Paris. 673 pp., 72 pl.
- BOISDUVAL, J. B. A. D. DE. 1833. Faune entomologique de Madagascar, Bourbon et Maurice: Lépidoptères. Librairie Encyclopédique de Roret, Paris. 122 pp., 16 pl.
- . 1836. Vol. 1. In: BOISDUVAL, J. B. A. D. DE & A. GUÉNEE, Suites à Buffon. Histoire naturelle des insectes. Spécies général des Lépidoptères. Librairie Encyclopédique de Roret, Paris.
- . 1852. Lépidoptères de la Californie. Ann. Soc. Entomol. France 10:275-324.
- . 1869. Lépidoptères de la Californie. Ann. Soc. Entomol. Belgium 12:1-28, 37-94.
- BOISDUVAL, J. B. A. D. DE & J. E. LE CONTE. 1829-[1837]. Histoire générale et iconographie des Lépidoptères et des chenilles de l'Amérique septentrionale. Librairie Encyclopédique de Roret, Paris. 225 pp., 78 pl.
- BOISDUVAL, J. B. A. D. DE., R. RAMBUR, & A. GRASLIN. 1832-1837. Collection iconographique et historique des chenilles, ou description et figures des chenilles d'Europe, avec l'histoire de leurs métamorphoses et des applications à l'agriculture. Librairie Encyclopédique de Roret, Paris. [465] pp., [126] pl.
- BROWN, F. M. 1965. Three letters from J. A. B. D. De Boisduval to W. H. Edwards, and the true identity of *Melitaea pola* Bdv. and *Melitaea callina* Bdv. J. Lepid. Soc. 19:197-211.
- CALHOUN, J. V. 2003. The history and true identity of *Melitaea ismeria* (Boisduval & Le Conte): a remarkable tale of duplication, misinterpretation and presumption. J. Lepid. Soc. 57:204-219.
- CHERMOCK, R. L. 1946. Migration in *Ascia monuste phileta* (Lepidoptera, Pieridae). Entomol. News 57:144-146.
- CLÉMENT, M. A.-L. 1857. Notice nécrologique sur Dupuiset (Louis-Marie-Alphonse). Ann. Soc. Entomol. France (6th series) 6:471-474.
- COMSTOCK, W. P. 1943. The genus *Ascia* in the Antilles. Amer. Mus. Nov. 1229:1-7.
- COWAN, C. F. 1969. Boisduval and Le Conte; Histoire Générale et Iconographie des Lépidoptères et des Chenilles de l'Amérique Septentrionale. J. Soc. Bibliog. Nat. His. 5:125-134.
- DEJEAN, P. F. M. A. & J. B. A. D. DE BOISDUVAL. 1829-1837. Iconographie et histoire naturelle de coléoptères d'Europe. 5 vols. Méquignon-Marvis, Paris.
- DOS PASSOS, C. F. 1962. The dates of publication of the Histoire Générale et Iconographie des Lépidoptères et des Chenilles de l'Amérique Septentrionale, by Boisduval and Le Conte 1829-1833-[1834]. J. Soc. Bibliog. Nat. His. 4:48-56.
- . 1964. A synonymic list of the Nearctic Rhopalocera. Lepid. Soc. Memoir No. 1. 145 pp.
- DOUBLEDAY, E. 1844. List of the specimens of lepidopterous insects in the collection of the British Museum. Pt. I. British Museum, London. 150 pp.
- . 1847. [Nomenclature on Plate 23]. In: DOUBLEDAY, E. & W. C. HEWITSON, The genera of diurnal Lepidoptera: comprising their generic characters, a notice of their habits and transformations and a catalogue of the species of each genus. Vol. 1. Longman, Brown, Green and Longmans, London.
- DOUBLEDAY, E., W. C. HEWITSON & J. O. WESTWOOD. 1846-1852. The genera of diurnal Lepidoptera: comprising their generic characters, a notice of their habits and transformations, and a catalogue of the species of each genus. 2 vols. Longman, Brown, Green, and Longmans, London. 534 pp., 56 pl.
- EMMEL, J. F., EMMEL, T. C., & S. O. MATTOON. 1995. The types of California butterflies named by Jean Alphonse Boisduval: designation of lectotypes and a neotype, and fixation of type localities, pp. 3-76. In: EMMEL, T. C. (ed.), Systematics of western North American butterflies, Mariposa Pr., Gainesville, Florida.
- FERRIS, C. D. 1959. Supplement to: a catalogue/checklist of the butterflies of America, north of Mexico. Lepid. Soc. Memoir No. 3. 103 pp.
- FORBES, W. T. M. 1943. What is *Thecla liparops*? (Lepidoptera, Lycaenidae). Entomol. News 54:115-117.
- GALL, L. F., & D. C. HAWKS. 2002. Systematics of moths in the genus *Catocala* (Noetuidae). III. The types of William H. Edwards, Augustus R. Grote, and Achille Guénee. J. Lepid. Soc. 56:234-264.
- GATRELLE, R. R. 1998. The rediscovery, taxonomy, and biology of *Chlosyne gorgone gorgone* and *Chlosyne ismeria* (Nymphalidae) in Burke County, Georgia. Taxon. Rpt. 1(2):1-9.
- . 2000. A day of collecting in Burke County Georgia. Int. Lepid. Survey Newsletter 2 (2):3-4.
- . 2001. An examination of southeastern U.S. *Satyrion* (Lycaenidae: Theclinae). Part two: the identification and delimitation of nominate *Satyrion liparops* and the description of a new subspecies from west central peninsular Florida. Taxon. Rpt. 3(3):1-8.
- . 2003. A taxonomic review of *Chlosyne ismeria* with description of a new *ismeria* subspecies from the southern Appalachian Mountains. Taxon. Rpt. 4 (4):1-15.
- GAUDRY, A. 1900. [Discours prononcé sur la tombe de M. Émile Blanchard]. Bull. Mus. Hist. Nat. Paris, 6:53-55
- GILBERT, P. 1998. John Abbot; birds, butterflies and other wonders. Merrell Holberton, London. 128 pp.
- GUÉNEE, A. 1852-1858. Vols. 5-10. In: BOISDUVAL, J. B. A. D. DE & A. GUÉNEE, Suites à Buffon. Histoire naturelle des insectes. Spécies général des Lépidoptères. Librairie Encyclopédique de Roret, Paris.
- GUNDLACH, J. 1851. Contribucion á la entomologia Cubana. G. Montiel, Havana. 445 pp.
- HARRIS, L. 1972. Butterflies of Georgia. Univ. Oklahoma Pr., Norman, Oklahoma. 326 pp.
- HARRIS, T. W. 1841. A report on the insects of Massachusetts, injurious to vegetation. Folsom, Wells, and Thurston. Cambridge. 459 pp.
- HEWES, L. I. 1936. Butterflies—try and get them. Nat. Geog. Mag. 69:667-678.
- HILLHOUSE, A. M. 1985. A history of Burke County, Georgia 1777-1950. Magnolia Pr., Swainsboro, Georgia. 339 pp.
- HOLLAND, W. J. 1895. The butterfly book. A popular guide to a knowledge of the butterflies of North America. Doubleday, Page, & Co., New York. 382 pp.
- HORN, W., I. KAHLE, G. FRIESE & R. GAEDIKE. 1990. Collectiones entomologicae: eine kompendium über den verbleib entomologischer sammlungen eer welt bis 1960. Akademie de Landwirtschaftswissenschaften, Berlin. 2 vols. 573 pp.
- HOWE, W. H. (ed). 1975. The butterflies of North America. Doubleday & Co., Garden City, New York. 633 pp., 97 pl.
- . 1975. Genus *Ascia* Seopoli, pp. 381-382. In: HOWE, W.

- H. (ed.). The butterflies of North America. Doubleday & Co., Garden City, New York.
- HÜBNER, J. (& C. GEYER). 1819-[1827]. Sammlung exotischer schmetterling. Augsburg, Germany. Vol. 2. [4] pp. [225] pl.
- KAWAHARA, A. Y. 2001. Systematics of the snout butterflies (Lepidoptera: Nymphalidae: Libytheinae) with an emphasis on morphology. Unpubl. Honors Thesis, Cornell Univ., Ithaca, New York. 162 pp.
- KIRBY, W. F. 1896. A hand-book to the order Lepidoptera. Pt. 1. Butterflies Vol. 2. W. H. Allen & Co., London. 332 pp., 31 pl.
- KLOTS, A. B. 1951. A field guide to the butterflies of North America, east of the great plains. Houghton Mifflin, Boston, Massachusetts. 349 pp.
- KRAUS, H. P. (firm). [1964]. The illustrated book. Sales cat. 108. New York. 90 pp. (originally undated; pub. year verified by H. P. Kraus).
- LESNE, P. 1901. Notice nécrologique sur Hyppolite [sic.] Lucas. Ann. Soc. Entomol. France 70:1-5.
- MALLIS, A. 1971. American entomologists. Rutgers Univ. Pr., New Brunswick, New Jersey. 549 pp.
- MEISSNER, G. 1996. Allgemeines Künstlerlexikon: die bildenden Künstler aller Zeiten und Völker. Vol. 13. K. G. Saur, Munich, Germany. 690 pp.
- MICHENER, C. D. & C. F. DOS PASSOS. 1942. Taxonomic observations on some North American *Strymon* with descriptions of new subspecies (Lepidoptera: Lycaenidae). Amer. Mus. Nov. 1210:1-7.
- MILLER, L. D. & F. M. BROWN. 1951. A catalogue/checklist of the butterflies of America north of Mexico. Lepid. Soc. Memoir No. 2. 280 pp.
- MINNO, M. C. 1994. Immature stages of the skipper butterflies (Lepidoptera: Hesperidae) of the United States: biology, morphology, and descriptions. Unpubl. Ph.D. Dissertation, Univ. Florida, Gainesville. 509 pp.
- MORRIS, J. G. 1862. Synopsis of the described Lepidoptera of North America. Part I. Diurnal and crepuscular Lepidoptera. Smiths. Misc. Coll., Washington, D. C. 358 pp.
- OBERTHÜR, C. 1850. Notice nécrologique sur le docteur Boisduval. Ann. Soc. Entomol. France (5th series) 10:129-135.
- . 1913. Lépidoptères de la California décrits par Boisduval en 1852 et en 1869. Études Lépid. Comp 9: 37-44, pls. 235-240.
- . 1914. Les Lépidoptères de la Californie par le Docteur Boisduval. Études Lépid. Comp 9:73-90, pls. 258-264.
- . 1920. Histoire Générale et Iconographie des Lépidoptères et des Chenilles de l'Amérique Septentrionale. Études Lépid. Comp. 17:11-20.
- OPLER, P. A. & A. D. WARREN. 2002. Butterflies of North America. 2. Scientific name list for butterfly species of North America, north of Mexico. C. P. Gillette Mus., Fort Collins, Colorado. 79 pp.
- PACKARD, A. S. 1876. A monograph of the geometrid moths or Phalaenidae of the United States. Govt. Printing Office, Washington, D. C. 607 pp.
- REMYNTOON, C. L. 1948. Brief biographies 10. John Abbot (1751-183-). Lepid. News 2:28-30.
- RILEY, N. D. 1927. The Oberthür collection of butterflies and moths. Nat. His. Mag. (British Mus.). 1:83-90.
- . 1964. The Department of Entomology of the British Museum (Natural History) 1904-1964: a brief historical sketch. British Mus. (N. H.). 48 pp.
- . 1975. A field guide to the butterflies of the West Indies. Collins, London. 224 pp.
- RÖBER, J. 1909. Genus *Pieris* Schrk., pp. 57-62. In: SEITZ, A. (ed.). Macrolepidoptera of the world. The American Rhopalocera (Macrolepidoptera of the American faunistic region). Vol. 5. Alfred Kernen Verlag, Stuttgart, Germany.
- ROGERS-PRICE, V. 1983. John Abbot in Georgia: the vision of a naturalist artist (1751-ca. 1840). Madison-Morgan Cult. Ctr., Madison, Georgia. 149 pp.
- SALMON, M. A. 2000. The aurelian legacy: British butterflies and their collectors. Univ. California Pr., Berkeley. 432 pp.
- SCUDDER, S. H. (ed.). 1869. Entomological correspondence of Thaddeus William Harris, M.D. Boston Soc. Nat. His., Boston, Massachusetts. 375 pp.
- . 1872. Abbott's [sic.] notes on Georgian butterflies. Can. Entomol. 4: 73-77, S4-S7.
- . 1875. Synonymic list of the butterflies of North America, north of Mexico. Pt. I. Nymphales. Bull. Buffalo Soc. Nat. His. 2:233-269.
- . 1888. John Abbot, the aurelian. Can. Entomol. 20:150-154.
- . 1888-1889. Butterflies of the eastern United States and Canada. 3 vols. Cambridge, Massachusetts. 1958 pp. S9 pl.
- SEITZ, A. 1916. Genus *Libythea* F., pp. 617-738. In: SEITZ, A. (ed.). Macrolepidoptera of the world. The American Rhopalocera (Macrolepidoptera of the American faunistic region). Vol. 5. Alfred Kernen Verlag, Stuttgart, Germany.
- SIMPSON, M. B. 1993. Artistic sources for John Abbot's watercolor drawings of American birds. Arch. Nat. His. 20:197-212.
- SMITH, D. S., L. D. MILLER & J. Y. MILLER. 1994. The butterflies of the West Indies and South Florida. Oxford Univ. Pr., New York. 264 pp.
- SMITH, J. E. & J. Abbot. 1797. The Natural History of the rarer lepidopterous insects of Georgia, including their systematic characters, the particulars of their several metamorphoses, and the plants on which they feed, collected from the observations of Mr. John Abbot, many years resident in that country. 2 vols. J. Edwards; Cadell and Davies; J. White. London. 214 pp. 104 pl.
- SOTHEBY & Co. (firm). 1963. Catalogue of a fine collection of rare books and drawings on natural history and travel. London. 55pp.
- SWAINSON, W. 1840. Taxidermy; with the biography of zoologists, and notices of their works. The Cabinet Cyclopaedia. Longman, Orme, Brown, Green & Longmans. London. 392 pp.
- TALBOT, G. 1932. Pieridae, pp. 1-320. In: Strand, E. (ed.). Lepidopterorum catalogus. Vol. 23, Pars. 53. W. Junk, Berlin.
- USC (University of South Carolina). 2003. The John Abbot watercolors at the University of South Carolina. Dept. of Rare Books & Special Collections. <http://www.sc.edu/library/spcoll/abbot/default.html> (version

11 Nov. 2003).

WILLIAMS, C. B. 1930. The migration of butterflies. Oliver and Boyd, London. 473 pp.

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